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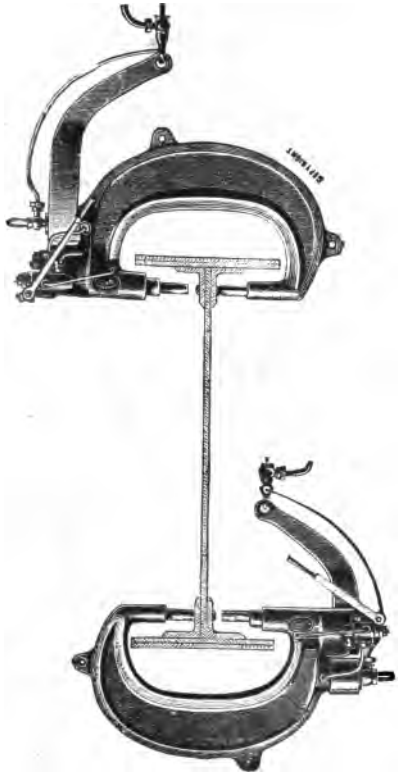

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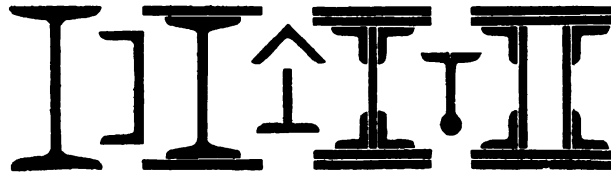
4	× 2	$6\frac{1}{4}$	× $3\frac{1}{8}$	8	× 6	12	× 5
4	× 3	6	× 5	$9\frac{1}{2}$	× $3\frac{3}{4}$	12	× 6
$4\frac{3}{4}$	× 2	7	× $2\frac{1}{2}$	$9\frac{1}{2}$	× $4\frac{1}{2}$	14	× 6
5	× 3	7	× $3\frac{1}{2}$	10	× $4\frac{1}{2}$	16	× 6



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3	× 3	5	× $4\frac{1}{2}$	8	× 4	10	× 5	14	× $5\frac{1}{2}$
4	× 2	$6\frac{1}{4}$	× 2	8	× 5	10	× 6	15	× $5\frac{7}{8}$
4	× 3	$6\frac{1}{4}$	× 3	8	× 6	12	× 5	$15\frac{3}{4}$	× $6\frac{1}{8}$
$4\frac{3}{4}$	× $1\frac{3}{4}$	6	× 5						

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STRESSES

IN

GIRDER AND ROOF TRUSSES

FOR BOTH DEAD AND LIVE LOADS BY

SIMPLE MULTIPLICATION

WITH STRESS CONSTANTS FOR 100 CASES

FOR THE USE OF CIVIL AND MECHANICAL ENGINEERS, ARCHITECTS AND DRAFTSMEN

BY

F. R. JOHNSON, Assoc. M. Inst. C.E.

CIVIL ENGINEER

PART I.—GIRDERS

PART II.—ROOFS

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PREFACE.

To MOST practical engineers and draftsmen who have to design girders and roofs, with little time to spare for mathematical investigation and calculation, the majority of the text-books on this subject are too abstruse.

In this work an attempt has been made to simplify the matter by giving stress constants for both dead and live loads, which only require to be multiplied by the panel load to give the maximum stress in any member of a truss, under the conditions which will be found in the text.

The Author does not wish to claim originality for the idea of calculating the stresses due to dead and live loads in the terms of a unit panel load, but he trusts it has been put into a practical shape, suitable alike to the wants of Civil and Mechanical Engineers, Architects and Draftsmen. No attempt has been made in any way to go beyond the subject, and the one hundred cases for which stress constants are given, will, it is hoped, be found suitable for every-day practice.

F. R. J.

BOMBAY: 1894.

NOTE.

As in a work of this kind accuracy is the first consideration, no effort has been spared to avoid errors.

The stress constants have been, as far as possible, determined in two or three different ways, and the results compared.

The signs + and − have also been very carefully checked, and the Author believes that those who do him the honour to use this little book will not find their confidence misplaced.

It need hardly be remarked that, both in the case of the girder and roof trusses, the loads are supposed to rest only at the joints, through the agency of cross girders, purlins, &c., and that if any portion of the load is otherwise laid on, the transverse stress caused thereby must be allowed for.

In conclusion, the Author hopes that these stress constants will lighten the labours of many who, like himself, are identified with the profession of engineering.

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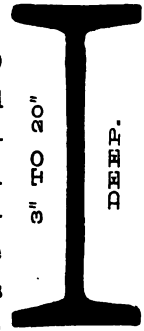

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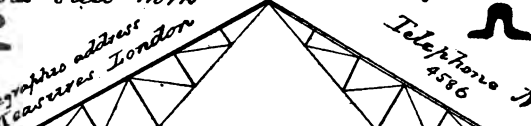

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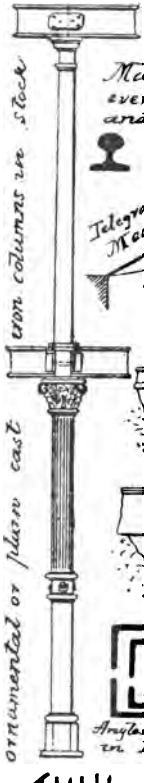

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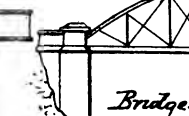

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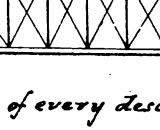

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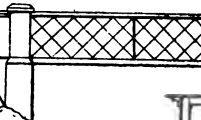

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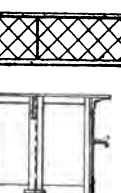

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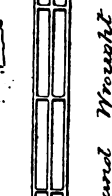

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STRESSES
IN GIRDER AND ROOF TRUSSES
BY SIMPLE MULTIPLICATION.

PART I.—GIRDERS.

INTRODUCTORY.

1. ABBREVIATIONS.

S = Stress in. + = Compression. − = Tension.

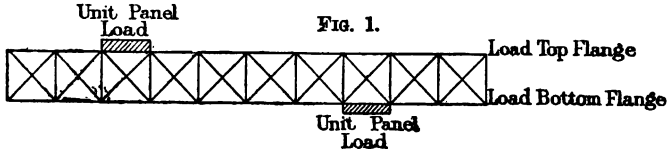


FIG. 1.

For Unit Panel Load see Fig. 1.

2. STRESS CONSTANTS FOR DEAD LOAD.

These are the stresses in each member of the girder when each panel is covered with a unit load. Taking Truss Diagram No. 1 as an example with a load of 1 ton, 1 kilogramme, or any other unit distributed over each of the twelve panels on the bottom flange, the stress constants are the resulting stresses in terms of the load.

3. MAXIMUM STRESS CONSTANTS FOR LIVE LOAD.

These are the maximum stresses in each member of the girder which could be caused by a unit load per

panel advancing from the left abutment, and crossing the girder to the right abutment, or *vice versâ*.

Taking Truss Diagram No. 1 as an example with a load of 1 ton, 1 kilogramme, or any other unit per panel advancing from either abutment, and crossing the girder on the bottom flange, the stress constants are the resulting maximum stresses in terms of the load.

4. Reference Numbers.

The numbers on the Truss Diagrams serve to indicate each member of a girder for which the stress constant is given. Taking Truss Diagram No. 1 as an example, under the head "Evenly distributed Dead Load, Stress Constants, Top Flange," will be found S. 1·3, and opposite, the stress constant + 5·50.

This means that the stress in the member 1·3 of Truss Diagram No. 1, due to a dead load of unit panel intensity, is compression 5·50.

5. Position of Load.

It will be noticed that for each diagram the dead load is supposed to be concentrated wholly on one flange.

As regards the parallel girders; in cases where this would not be considered sufficiently accurate half the stresses can be calculated from the stress constants belonging to the truss diagram where the load is on the top flange, and the other half from the constants for the diagram where the load is on the bottom flange.

6. The Dynamic Method for Augmented Stresses.

The stress constants are equally applicable for calculating the augmented stresses resulting from the dynamic method for proportioning the members of a girder to resist suddenly applied loads.

7. Theoretically Imperfect Girders.

It is hardly necessary to observe that in the case of theoretically imperfect girders, i. e. those having a redundance of parts (Truss Diagram No. 14 for instance), certain assumptions have been made as to the way the stresses will go, which of course it is practically difficult to make certain of, and in these cases the only thing to do is to see that the sectional area is sufficient for the worst combination.

8. Difference between Parabolic Bowstring Girder and Braced Arch.

It is well to state that an essential difference exists between a parabolic bowstring girder and a parabolic braced arch.

In the former case the maximum stress in the bow results when the whole bridge is covered with the live load, but in the latter case it is not so.

9. Concentrated Axle Loads and Effective Live Load.

In English practice it is generally considered sufficient to use the "effective live load" when calculating the stresses in the flanges and bracing.

By "effective live load" is meant the corresponding evenly distributed load, which causes an equivalent stress in the flanges at the centre, to that which results from the worst possible combination of concentrated axle loads.

In cases where this is not considered sufficiently accurate, the method proposed by Mr. Claxton Fidler might be adopted, viz. to calculate the stresses for the

ordinary train load (using the stress constants in the following pages), and then work out the stresses caused by the excess engine load per foot, for one or two engine lengths, as may be decided on, and add the results to the former calculation. The excess load can also be taken as a uniform weight per foot, i. e. weight of engine divided by length over buffers minus train load per foot first taken.

To calculate the exact stresses due to the separate axle loads would, except in the case of very small spans, be an unnecessary refinement, particularly when, as is usual now, some allowance is made for impact, which must necessarily be more or less approximate.

It will therefore generally be quite sufficient for all practical purposes to use the "effective live load" in calculating the stresses, and as proposed by Mr. Claxton Fidler, to add the difference between the maximum and minimum stresses to the maximum stresses in the bracing, and half the difference in the case of the flanges, afterwards using a factor of safety of 3 to 4.

Vertical suspenders which carry the roadway, and other verticals which are supposed to distribute the load between the top and bottom flanges, must be made strong enough to bear any concentrated axle load which may come on them, and where the cross girders are spaced further apart than the engine wheels, this would be exceeded by a proportional part of one or more adjacent axle loads.

End posts, when the load is on the top flange, would have this concentrated load to bear, in addition to any possible stress caused by the bracing, and, referring to paragraph 7, it is in all cases necessary to look practically into these matters, when the quantity of metal in the various parts of the truss comes to be apportioned.

10. Fully worked out Example.

As an example, the stresses will be calculated in detail for a single line through bridge consisting of two girders of the type shown in Truss Diagram No. 20. Span 60 feet. Dead load 0·5 ton per lineal foot, and effective live load 1·5 tons per lineal foot.

The panels loads for one girder will therefore be 6 feet × 0·5 ton ÷ 2 = 1½ tons for dead load, and 6 feet × 1·5 tons ÷ 2 = 4½ tons for live load.

The stresses are as follows:

For Dead Load.

		Tons
Top flange:		
S. 1·3 = stress constant	2·00 × 1½ tons panel load =	+ 3·00
3·5	6·00 × 1½	+ 9·00
5·7	9·00 × 1½	+13·50
7·9	11·00 × 1½	+16·50
9·11	12·00 × 1½	+18·00
Bottom flange:		
S. 2·4 = stress constant	2·50 × 1½ tons panel load =	− 3·75
4·6	6·50 × 1½	− 9·75
6·8	9·50 × 1½	−14·25
8·10	11·50 × 1½	−17·25
10·12	12·50 × 1½	−18·75
Diagonal bracing:		
S. 2·3 = stress constant	3·53 × 1½ tons panel load =	+ 5·30
4·5	2·83 × 1½	+ 4·25
6·7	2·12 × 1½	+ 3·18
8·9	1·41 × 1½	+ 2·12
10·11	0·70 × 1½	+ 1·05
1·4	2·83 × 1½	− 4·25
3·6	2·12 × 1½	− 3·18
5·8	1·41 × 1½	− 2·12
7·10	0·70 × 1½	− 1·05
9·12	0·00 × 1½	− 0·00
End verticals:		
S. 1·2 = stress constant	2·50 × 1½ tons panel load =	+ 3·75

For Live Load.

			Tons
Top flange:			
S. 1·3	= stress constant	2·00 × 4½ tons panel load =	+ 9·00
3·5		6·00 × 4½	+27·00
5·7		9·00 × 4½	+40·50
7·9		11·00 × 4½	+49·50
9·11		12·00 × 4½	+54·00
Bottom flange:			
S. 2·4	= stress constant	2·50 × 4½ tons panel load =	−11·25
4·6		6·50 × 4½	−29·25
6·8		9·50 × 4½	−42·75
8·10		11·50 × 4½	−51·75
10·12		12·50 × 4½	−56·25
Diagonal bracing:			
S. 2·3	= stress constant	3·53 × 4½ tons panel load =	+15·89
2·3		0·00 × 4½	− 0·00
4·5		2·83 × 4½	+12·74
4·5		0·00 × 4½	− 0·00
6·7		2·26 × 4½	+10·17
6·7		0·14 × 4½	− 0·63
8·9		1·69 × 4½	+ 7·60
8·9		0·28 × 4½	− 1·26
10·11		1·27 × 4½	+ 5·72
10·11		0·57 × 4½	− 2·57
1·4		0·00 × 4½	+ 0·00
1·4		2·83 × 4½	−12·74
3·6		0·14 × 4½	+ 0·63
3·6		2·26 × 4½	−10·17
5·8		0·28 × 4½	+ 1·26
5·8		1·69 × 4½	− 7·60
7·10		0·57 × 4½	+ 2·57
7·10		1·27 × 4½	− 5·72
9·12		0·85 × 4½	+ 3·83
9·12		0·85 × 4½	− 3·83
End verticals:			
S. 1·2	= stress constant	2·50 × 4½ tons panel load =	+11·25
1·2		0·00 × 4½	− 0·00

Maximum Stresses for Combined Dead and Live Loads.

		Tons		Tons		Total tons
Top flange:						
S. 1·3	=	+ 3·00	and	+ 9·00	=	+ 12·00
3·5		+ 9·00		+ 27·00		+ 36·00
5·7		+ 13·50		+ 40·50		+ 54·00
7·9		+ 16·50		+ 49·50		+ 66·00
9·11		+ 18·00		+ 54·00		+ 72·00
Bottom flange:						
S. 2·4	=	− 3·75	and	− 11·25		− 15·00
4·6		− 9·75		− 29·25		− 39·00
6·8		− 14·25		− 42·75		− 57·00
8·10		− 17·25		− 51·75		− 69·00
10·12		− 18·75		− 56·25		− 75·00
Diagonal bracing:						
S. 2·3	=	+ 5·30	and	+ 15·89		+ 21·19
2·3		+ 5·30		− 0·00		− 0·00
4·5		+ 4·25		+ 12·74		+ 16·99
4·5		+ 4·25		− 0·00		− 0·00
6·7		+ 3·18		+ 10·17		+ 13·35
6·7		+ 3·18		− 0·63		− 0·00
8·9		+ 2·12		+ 7·60		+ 9·72
8·9		+ 2·12		− 1·26		− 0·00
10·11		+ 1·05		+ 5·72		+ 6·77
10·11		+ 1·05		− 2·57		− 1·52
1·4		− 4·25		+ 0·00		+ 0.00
1·4		− 4·25		− 12·74		− 16·99
3·6		− 3·18		+ 0·63		+ 0·00
3·6		− 3·18		− 10·17		− 13·35
5·8		− 2·12		+ 1·26		+ 0·00
5·8		− 2·12		− 7·60		− 9·72
7·10		− 1·05		+ 2·57		+ 1·52
7·10		− 1·05		− 5·72		− 6·77
9·12		− 0·00		+ 3·83		+ 3·83
9·12		− 0·00		− 3·83		− 3·83
1·2		+ 3·75		+ 11·25		+ 15·00
1·2		+ 3·75		− 0·00		− 0·00

It will be noticed that the only web members which suffer counter strains in this case are 10·11 — 7·10 and 9·12.

STRESS CONSTANTS FOR DEAD AND LIVE LOADS OF UNIT PANEL INTENSITY.

TRUSS DIAGRAM No. 1.

LINVILLE.

CONDITIONS.

1. Depth .. .. $\frac{1}{12}$ of the span.
2. Number of panels .. .. 12.
3. Method of loading .. .. On bottom flange.
4. Description of bracing .. Vertical, and inclined angle 45°.

EVENLY DISTRIBUTED DEAD LOAD.

Stress Constants.

Top flange:

S. 1·3	+	5·50	S. 7·9	+	16·00
3·5	+	10·00	9·11	+	17·50
5·7	+	13·50	11·13	+	18·00

Bottom flange:

S. 2·4	−	0·00	S. 8·10	−	13·50
4·6	−	5·50	10·12	−	16·00
6·8	−	10·00	12·14	−	17·50

Vertical bracing all struts under dead load:

S. 1·2	+	5·50	S. 9·10	+	1·50
3·4	+	4·50	11·12	+	0·50
5·6	+	3·50	13·14	+	0·00
7·8	+	2·50			

Diagonal bracing all ties under dead load:

S. 1·4	−	7·75	S. 7·10	−	3·52
3·6	−	6·34	9·12	−	2·11
5·8	−	4·93	11·14	−	0·70

EVENLY DISTRIBUTED LIVE LOAD ADVANCING FROM EITHER ABUTMENT.

Maximum Stress Constants.

Top flange:

S. 1·3	+	5·50	S. 7·9	+	16·00
3·5	+	10·00	9·11	+	17·50
5·7	+	13·50	11·13	+	18·00

Bottom flange:

S. 2·4	−	0·00	S. 8·10	−	13·50
4·6	−	5·50	10·12	−	16·00
6·8	−	10·00	12·14	−	17·50

Vertical bracing:

S. 1·2	+	5·500	S. 7·8	−	0·500
1·2	−	0·000	9·10	+	2·333
3·4	+	4·583	9·10	−	0·833
3·4	−	0·083	11·12	+	1·750
5·6	+	3·750	11·12	−	1·250
5·6	−	0·250	13·14	+	0·000
7·8	+	3·000	13·14	−	0·000

Diagonal bracing:

S. 1·4	+	0·000	S. 7·10	+	0·705
1·4	−	7·755	7·10	−	4·230
3·6	+	0·117	9·12	+	1·174
3·6	−	6·462	9·12	−	3·289
5·8	+	0·352	11·14	+	1·762
5·8	−	5·287	11·14	−	2·467

Note.—The parts 2·4 would practically be made of the same strength as 4·6, and 13·14 the same as 11·12.

TRUSS DIAGRAM No. 2.

LINVILLE.

CONDITIONS.

1. Depth .. .. $\frac{1}{12}$ of the span.
2. Number of panels .. .. 12.
3. Method of loading .. .. On top flange.
4. Description of bracing .. Vertical, and inclined angle 45°.

EVENLY DISTRIBUTED DEAD LOAD.

Stress Constants.

Top flange:

S. 1·3	+	5·50	S. 7·9	+	16·00
3·5	+	10·00	9·11	+	17·50
5·7	+	13·50	11·13	+	18·00

Bottom flange:

S. 2·4	−	0·00	S. 8·10	−	13·50
4·6	−	5·50	10·12	−	16·00
6·8	−	10·00	12·14	−	17·50

Vertical bracing all struts under dead load:

S. 1·2	+	6·00	S. 9·10	+	2·50
3·4	+	5·50	11·12	+	1·50
5·6	+	4·50	13·14	+	1·00
7·8	+	3·50			

Diagonal bracing all ties under dead load:

S. 1·4	−	7·75	S. 7·10	−	3·52
3·6	−	6·34	9·12	−	2·11
5·8	−	4·93	11·14	−	0·70

EVENLY DISTRIBUTED LIVE LOAD ADVANCING FROM EITHER ABUTMENT.

Maximum Stress Constants.

Top flange:

S. 1·3	+	5·50	S. 7·9	+	16·00
3·5	+	10·00	9·11	+	17·50
5·7	+	13·50	11·13	+	18·00

Bottom flange:

S. 2·4	−	0·00	S. 8·10	−	13·50
4·6	−	5·50	10·12	−	16·00
6·8	−	10·00	12·14	−	17·50

Vertical bracing:

S. 1·2	+	6·000	S. 7·8	−	0·250
1·2	−	0·000	9·10	+	3·000
3·4	+	5·500	9·10	−	0·500
3·4	−	0·000	11·12	+	2·333
5·6	+	4·583	11·12	−	0·833
5·6	−	0·083	13·14	+	1·000
7·8	+	3·750	13·14	−	0·000

Diagonal bracing:

S. 1·4	+	0·000	S. 7·10	+	0·705
1·4	−	7·755	7·10	−	4·230
3·6	+	0·117	9·12	+	1·174
3·6	−	6·462	9·12	−	3·289
5·8	+	0·352	11·14	+	1·762
5·8	−	5·287	11·14	−	2·467

Note.—If this truss is supported at the points 2·2, the parts 2·4 would practically be made of the same strength as 4·6, but if supported at the points 1·1, the parts 1·2 and 2·4 are not necessary.

TRUSS DIAGRAM No. 3.

LINVILLE.

Conditions.

1. Depth .. .. $\frac{1}{12}$ of the span.
2. Number of panels .. .. 12.
3. Method of loading .. .. On bottom flange.
4. Description of bracing .. Vertical, and inclined angle 45°.

Evenly distributed Dead Load.

Stress Constants.

Top flange:

S. 1·3	+	0·00	S. 7·9	+	13·50
3·5	+	5·50	9·11	+	16·00
5·7	+	10·00	11·13	+	17·50

Bottom flange:

S. 2·4	−	5·50	S. 8·10	−	16·00
4·6	−	10·00	10·12	−	17·50
6·8	−	13·50	12·14	−	18·00

Vertical bracing all ties under dead load:

S. 1·2	−	0·00	S. 9·10	−	2·50
3·4	−	5·50	11·12	−	1·50
5·6	−	4·50	13·14	−	1·00
7·8	−	3·50			

Diagonal bracing all struts under dead load:

S. 2·3	+	7·75	S. 8·9	+	3·52
4·5	+	6·34	10·11	+	2·11
6·7	+	4·93	12·13	+	0·70

EVENLY DISTRIBUTED LIVE LOAD ADVANCING FROM EITHER ABUTMENT.

Maximum Stress Constants.

Top flange:

S. 1·3	+	0·00	S. 7·9	+	13·50
3·5	+	5·50	9·11	+	16·00
5·7	+	10·00	11·13	+	17·50

Bottom flange:

S. 2·4	−	5·50	S. 8·10	−	16·00
4·6	−	10·00	10·12	−	17·50
6·8	−	13·50	12·14	−	18·00

Vertical bracing:

S. 1·2	+	0·000	S. 7·8	−	3·750
1·2	−	0·000	9·10	+	0·500
3·4	+	0·000	9·10	−	3·000
3·4	−	5·500	11·12	+	0·833
5·6	+	0·083	11·12	−	2·333
5·6	−	4·583	13·14	+	0·000
7·8	+	0·250	13·14	−	1·000

Diagonal bracing:

S. 2·3	+	7·755	S. 8·9	+	4·230
2·3	−	0·000	8·9	−	0·705
4·5	+	6·462	10·11	+	3·289
4·5	−	0·117	10·11	−	1·174
6·7	+	5·287	12·13	+	2·467
6·7	−	0·352	12·13	−	1·762

Note.—The parts 1·2 and 1·3 are not necessary to stability.

TRUSS DIAGRAM No. 4.

LINVILLE.

CONDITIONS.

1. Depth .. .. $\frac{1}{12}$ of the span.
2. Number of panels .. .. 12.
3. Method of loading .. .. On top flange.
4. Description of bracing .. Vertical, and inclined angle 45°.

EVENLY DISTRIBUTED DEAD LOAD.

Stress Constants.

Top flange:

S. 1·3	+	0·00	S. 7·9	+	13·50
3·5	+	5·50	9·11	+	16·00
5·7	+	10·00	11·13	+	17·50

Bottom flange:

S. 2·4	−	5·50	S. 8·10	−	16·00
4·6	−	10·00	10·12	−	17·50
6·8	−	13·50	12·14	−	18·00

Vertical bracing all ties under dead load except 1·2:

S. 1·2	+	0·50	S. 9·10	−	1·50
3·4	−	4·50	11·12	−	0·50
5·6	−	3·50	13·14	−	0·00
7·8	−	2·50			

Diagonal bracing all struts under dead load:

S. 2·3	+	7·75	S. 8·9	+	3·52
4·5	+	6·34	10·11	+	2·11
6·7	+	4·93	12·13	+	0·70

EVENLY DISTRIBUTED LIVE LOAD ADVANCING FROM EITHER ABUTMENT.

Maximum Stress Constants.

Top flange:

S. 1·3	+	0·00	S. 7·9	+	13·50
3·5	+	5·50	9·11	+	16·00
5·7	+	10·00	11·13	+	17·50

Bottom flange:

S. 2·4	−	5·50	S. 8·10	−	16·00
4·6	−	10·00	10·12	−	17·50
6·8	−	13·50	12·14	−	18·00

Vertical bracing:

S. 1·2	+	0·500	S. 7·8	−	3·000
1·2	−	0·000	9·10	+	0·833
3·4	+	0·083	9·10	−	2·333
3·4	−	4·583	11·12	+	1·250
5·6	+	0·250	11·12	−	1·750
5·6	−	3·750	13·14	+	0·000
7·8	+	0·500	13·14	−	0·000

Diagonal bracing:

S. 2·3	+	7·755	S. 8·9	+	4·230
2·3	−	0·000	8·9	−	0·705
4·5	+	6·462	10·11	+	3·289
4·5	−	0·117	10·11	−	1·174
6·7	+	5·287	12·13	+	2·467
6·7	−	0·352	12·13	−	1·762

Note.—The parts 1·3 would practically be made of the same strength as 3·5, and 13·14 the same as 11·12. The parts 1·2 require particularly to be considered for axle loads.

TRUSS DIAGRAM No. 5.

LATTICE.

CONDITIONS.

1. Depth .. .. $\frac{1}{12}$ of the span.
2. Number of panels .. .. 12.
3. Method of loading .. .. On bottom flange.
4. Description of bracing .. Crossed diagonals, angle 45°.

EVENLY DISTRIBUTED DEAD LOAD.

Stress Constants.

Top flange:

S. 1·3	+	3·00	S. 7·9	+	15·00
3·5	+	8·00	9·11	+	17·00
5·7	+	12·00	11·13	+	18·00

Bottom flange:

S. 2·4	−	2·50	S. 8·10	−	14·50
4·6	−	7·50	10·12	−	16·50
6·8	−	11·50	12·14	−	17·50

Diagonal bracing struts under dead load:

S. 2·3	+	3·53	S. 8·9	+	1·41
4·5	+	2·83	10·11	+	0·70
6·7	+	2·12	12·13	+	0·00

End verticals:

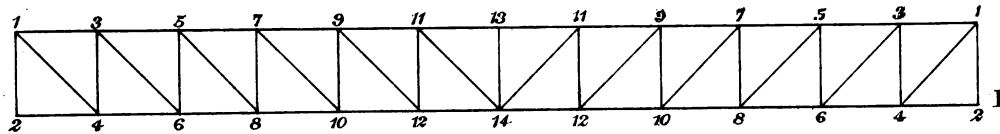
S. 1·2 .. .. .. + 3·00

Diagonal bracing ties under dead load:

S. 1·4	−	4·24	S. 7·10	−	2·12
3·6	−	3·53	9·12	−	1·41
5·8	−	2·83	11·14	−	0·70

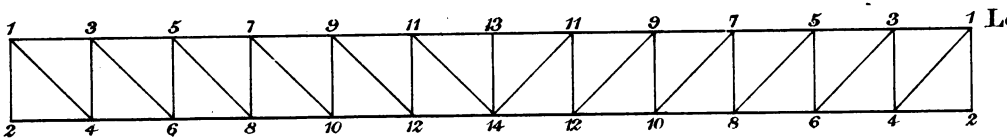
TRUSS DIAGRAMS

1



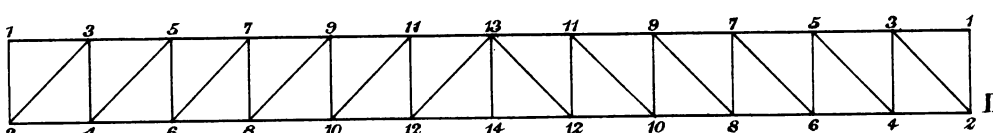
Load Line

2



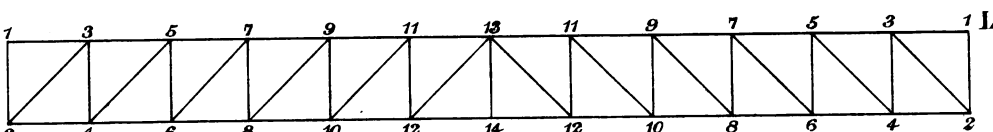
Load Line

3



Load Line

4



Load Line

E & F N Spon, London & New York

Thos Kell & Son Lith

PLATE 1

EVENLY DISTRIBUTED LIVE LOAD ADVANCING FROM EITHER ABUTMENT.

Maximum Stress Constants.

Top flange:

S. 1·3	+	3·00	S. 7·9	+	15·00
3·5	+	8·00	9·11	+	17·00
5·7	+	12·00	11·13	+	18·00

Bottom flange:

S. 2·4	−	2·50	S. 8·10	−	14·50
4·6	−	7·50	10·12	−	16·50
6·8	−	11·50	12·14	−	17·50

Diagonal bracing:

S. 2·3	+	3·525	S. 1·4	+	0·000
2·3	−	0·000	1·4	−	4·242
4·5	+	2·945	3·6	+	0·000
4·5	−	0·115	3·6	−	3·525
6·7	+	2·349	5·8	+	0·115
6·7	−	0·234	5·8	−	2·945
8·9	+	1·879	7·10	+	0·234
8·9	−	0·469	7·10	−	2·349
10·11	+	1·414	9·12	+	0·469
10·11	−	0·707	9·12	−	1·879
12·13	+	1·057	11·14	+	0·707
12·13	−	1·057	11·14	−	1·414

End verticals:

S. 1·2	..	..	..	+	3·00
1·2	..	..	..	−	0·00

TRUSS DIAGRAM No. 6.

LATTICE.

CONDITIONS.

1. Depth .. .. $\frac{1}{12}$ of the span.
2. Number of panels .. .. 12.
3. Method of loading .. .. On top flange.
4. Description of bracing .. Crossed diagonals, angle 45°.

EVENLY DISTRIBUTED DEAD LOAD.

Stress Constants.

Top flange :

S. 1·3	+	2·50	S. 7·9	+	14·50
3·5	+	7.50	9·11	+	16·50
5·7	+	11·50	11·13	+	17·50

Bottom flange :

S. 2·4	−	3·00	S. 8·10	−	15·00
4·6	−	8·00	10·12	−	17·00
6·8	−	12·00	12·14	−	18·00

Diagonal bracing struts under dead load :

S. 2·3	+	4·24	S. 8·9	+	2·12
4·5	+	3·53	10·11	+	1·41.
6·7	+	2·83	12·13	+	0·70

End verticals :

S. 1·2 .. .. .. + 3·00

Diagonal bracing ties under dead load :

S. 1·4	−	3·53	S. 7·10	−	1·41
3·6	−	2·83	9·12	−	0·70
5·8	−	2·12	11·14	−	0·00

EVENLY DISTRIBUTED LIVE LOAD ADVANCING FROM EITHER ABUTMENT.

Maximum Stress Constants.

Top flange:

S. 1·3	+	2·50	S. 7·9	+	14·50
3·5	+	7·50	9·11	+	16·50
5·7	+	11·50	11·13	+	17·50

Bottom flange:

S. 2·4	−	3·00	S. 8·10	−	15·00
4·6	−	8·00	10·12	−	17·00
6·8	−	12·00	12·14	−	18·00

Diagonal bracing:

S. 2·3	+	4·242	S. 1·4	+	0·000
2·3	−	0·000	1·4	−	3·525
4·5	+	3·525	3·6	+	0·115
4·5	−	0·000	3·6	−	2·945
6·7	+	2·945	5·8	+	0·234
6·7	−	0·115	5·8	−	2·349
8·9	+	2·349	7·10	+	0·469
8·9	−	0·234	7·10	−	1·879
10·11	+	1·879	9·12	+	0·707
10·11	−	0·469	9·12	−	1·414
12·13	+	1·414	11·14	+	1·057
12·13	−	0·707	11·14	−	1·057

End verticals:

S. 1·2	..	..	..	+	3·000
1·2	..	..	..	−	0·000

TRUSS DIAGRAM No. 7.

LATTICE.

CONDITIONS.

1. Depth .. .. $\frac{1}{12}$ of the span.
2. Number of panels .. .. 12.
3. Method of loading .. .. On bottom flange.
4. Description of bracing .. Verticals and crossed diagonals, angle 45°.

EVENLY DISTRIBUTED DEAD LOAD.

Stress Constants.

Top flange:

S. 1·3	+	2·75	S. 7·9	+	14·75
3·5	+	7·75	9·11	+	16·75
5·7	+	11·75	11·13	+	17·75

Bottom flange:

S. 2·4	−	2·75	S. 8·10	−	14·75
4·6	−	7·75	10·12	−	16·75
6·8	−	11·75	12·14	−	17·75

Diagonal bracing struts under dead load:

S. 2·3	+	3·88	S. 8·9	+	1·76
4·5	+	3·17	10·11	+	1·06
6·7	+	2·47	12·13	+	0·35

Diagonal bracing ties under dead load:

S. 1·4	−	3·88	S. 7·10	−	1·76
3·6	−	3·17	9·12	−	1·06
5·8	−	2·47	11·14	−	0·35

Vertical bracing:

S. on all the verticals except 1·2	−	0·50
S. 1·2	+	2·75

Note.—With load top flange all stresses the same except vertical bracing.

Vertical bracing load on top flange:

S. on all the verticals except 1·2	+	0·50
S. 1·2	+	3·00

EVENLY DISTRIBUTED LIVE LOAD ADVANCING FROM EITHER ABUTMENT.

Maximum Stress Constants.

Top flange:

S. 1·3	+	2·75	S. 7·9	+	14·75
3·5	+	7·75	9·11	+	16·75
5·7	+	11·75	11·13	+	17·75

Bottom flange:

S. 2·4	−	2·75	S. 8·10	−	14·75
4·6	−	7·75	10·12	−	16·75
6·8	−	11·75	12·14	−	17·75

Diagonal bracing:

S. 2·3	+	3·877	S. 1·4	+	0·000
2·3	−	0·000	1·4	−	3·877
4·5	+	3·231	3·6	+	0·059
4·5	−	0·059	3·6	−	3·231
6·7	+	2·643	5·8	+	0·176
6·7	−	0·176	5·8	−	2·643
8·9	+	2·115	7·10	+	0·352
8·9	−	0·352	7·10	−	2·115
10·11	+	1·644	9·12	+	0·586
10·11	−	0·586	9·12	−	1·644
12·13	+	1·233	11·14	+	0·881
12·13	−	0·881	11·14	−	1·233

Vertical bracing:

S. on all the verticals except 1·2	−	0·50
S. 1·2	+	2·75

Note.—With load top flange all stresses the same except vertical bracing.

Vertical bracing load on top flange:

S. on all the verticals except 1·2	+	0·50
S. 1·2	+	3·00

Note.—The verticals are only supposed to distribute the load between the flanges.

TRUSS DIAGRAM No. 8.

LINVILLE.

Conditions.

1. Depth ... . $\frac{1}{11}$ of the span.
2. Number of panels .. .. 11.
3. Method of loading .. .. On bottom flange.
4. Description of bracing .. Vertical, and inclined angle 45°.

Evenly distributed Dead Load.

Stress Constants.

Top flange:

S. 1·3	+	5·00	S. 7·9	+	14·00
3·5	+	9·00	9·11	+	15·00
5·7	+	12·00	11·11	+	15·00

Bottom flange:

S. 2·4	−	0·00	S. 8·10	−	12·00
4·6	−	5·00	10·12	−	14·00
6·8	−	9·00	12·12	−	15·00

Vertical bracing all struts under dead load:

S. 1·2	+	5·00
3·4	+	4·00
5·6	+	3·00
7·8	+	2·00
9·10	+	1·00
11·12 (vertical)	+	0·00

Diagonal bracing all ties under dead load:

S. 1·4	..	..	..	−	7·07
3·6	..	..	..	−	5·65
5·8	..	..	..	−	4·24
7·10	..	..	..	−	2·83
9·12	..	..	..	−	1·41
11·12 (diagonal)	..	..		−	0·00

EVENLY DISTRIBUTED LIVE LOAD ADVANCING FROM EITHER ABUTMENT.

Maximum Stress Constants.

Top flange:

S. 1·3	+	5·00	S. 7·9	+	14·00
3·5	+	9·00	9·11	+	15·00
5·7	+	12·00	11·11	+	15·00

Bottom flange:

S. 2·4	−	0·00	S. 8·10	−	12·00
4·6	−	5·00	10·12	−	14·00
6·8	−	9·00	12·12	−	15·00

Vertical bracing:

S. 1·2	..	..	..	+	5·000
1·2	..	..	..	−	0·000
3·4	..	..	..	+	4·091
3·4	..	..	..	−	0·091
5·6	..	..	..	+	3·273
5·6	..	..	..	−	0·273
7·8	..	..	..	+	2·545
7·8	..	..	..	−	0·545
9·10	..	..	..	+	1·910
9·10	..	..	..	−	0·910
11·12 (vertical)	..	..		+	1·364
11·12 (vertical)	..	..		−	1·364

Diagonal bracing:

S. 1·4	.. .. ..	+	0·000
1·4	.. .. ..	−	7·070
3·6	.. .. ..	+	0·128
3·6	.. .. ..	−	5·768
5·8	.. .. ..	+	0·384
5·8	.. .. ..	−	4·614
7·10	.. .. ..	+	0·762
7·10	.. .. ..	−	3·588
9·12	.. .. ..	+	1·283
9·12	.. .. ..	−	2·693
11·12 (diagonal)	.. ..	+	1·923
11·12 (diagonal)	.. ..	−	1·923

Note.—The parts 2·4 would practically be made of the same strength as 4·6.

TRUSS DIAGRAM No. 9.

LINVILLE.

CONDITIONS.

1. Depth .. .. $\frac{1}{11}$ of the span.
2. Number of panels .. .. 11.
3. Method of loading .. .. On top flange.
4. Description of bracing .. Vertical, and inclined angle 45°.

EVENLY DISTRIBUTED DEAD LOAD.

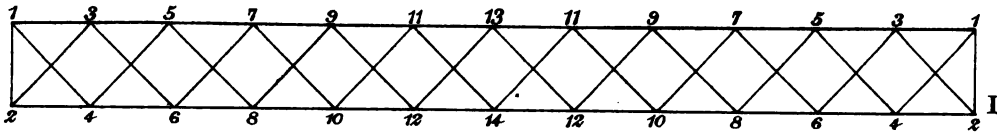
Stress Constants.

Top flange:

S. 1·3	+ 5·00	S. 7·9	+ 14·00
3·5	+ 9·00	9·11	+ 15·00
5·7	+ 12·00	11·11	+ 15·00

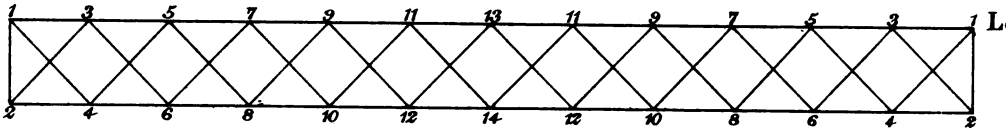
TRUSS DIAGRAMS

5



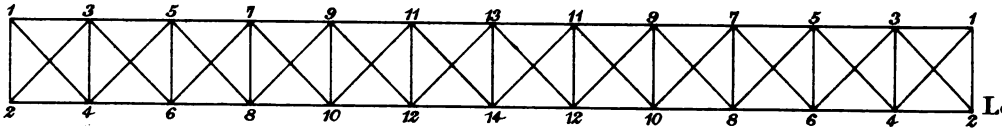
Load Line

6



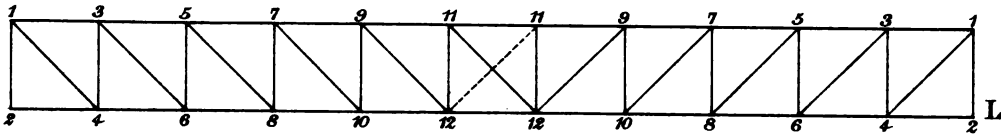
Load Line

7



Load Line

8



Load Line

E & F.N Spon, London & New York

Thos Hall & Son Lith

PLATE 2.

Bottom flange:

S. 2·4	–	0·00	S. 8·10	–	12·00
4·6	–	5·00	10·12	–	14·00
6·8	–	9·00	12·12	–	15·00

Vertical bracing all struts under dead load:

S. 1·2	.. .. ..	+	5·50
3·4	.. .. ..	+	5·00
5·6	.. .. ..	+	4·00
7·8	.. .. ..	+	3·00
9·10	.. .. ..	+	2·00
11·12 (vertical)	.. ..	+	1·00

Diagonal bracing all ties under dead load:

S. 1·4	.. .. ..	–	7·07
3·6	.. .. ..	–	5·65
5·8	.. .. ..	–	4·24
7·10	.. .. ..	–	2·83
9·12	.. .. ..	–	1·41
11·12 (diagonal)	.. ..	–	0·00

EVENLY DISTRIBUTED LIVE LOAD ADVANCING FROM EITHER ABUTMENT.

Maximum Stress Constants.

Top flange:

S. 1·3	+	5·00	S. 7·9	+	14·00
3·5	+	9·00	9·11	+	15·00
5·7	+	12·00	11·11	+	15·00

Bottom flange:

S. 2·4	–	0·00	S. 8·10	–	12·00
4·6	–	5·00	10·12	–	14·00
6·8	–	9·00	12·12	–	15·00

Vertical bracing:

S. 1·2	.. .. ..	+	5·500
1·2	.. .. ..	−	0·000
3·4	.. .. ..	+	5·000
3·4	.. .. ..	−	0·000
5·6	.. .. ..	+	4·091
5·6	.. .. ..	−	0·091
7·8	.. .. ..	+	3·273
7·8	.. .. ..	−	0·273
9·10	.. .. ..	+	2·545
9·10	.. .. ..	−	0·545
11·12 (vertical)	.. ..	+	1·910
11·12 (vertical)	.. ..	−	0·910

Diagonal bracing:

S. 1·4	.. .. ..	+	0·000
1·4	.. .. ..	−	7·070
3·6	.. .. ..	+	0·128
3·6	.. .. ..	−	5·768
5·8	.. .. ..	+	0·384
5·8	.. .. ..	−	4·614
7·10	.. .. ..	+	0·762
7·10	.. .. ..	−	3·588
9·12	.. .. ..	+	1·283
9·12	.. .. ..	−	2·693
11·12 (diagonal)	.. ..	+	1·923
11·12 (diagonal)	.. ..	−	1·923

Note.—If the truss is supported at the points 2·2 the parts 2·4 would practically be made of the same strength as 4·6; but if supported at the points 1·1 the parts 1·2 and 2·4 are not necessary.

TRUSS DIAGRAM No. 10.

LINVILLE.

CONDITIONS.

1. Depth .. .. $\frac{1}{11}$ of the span.
2. Number of panels .. .. 11.
3. Method of loading .. .. On bottom flange.
4. Description of bracing .. Vertical, and inclined angle 45°.

EVENLY DISTRIBUTED DEAD LOAD.

Stress Constants.

Top flange:

S. 1·3	+	0·00	S. 7·9	+	12·00
3·5	+	5·00	9·11	+	14·00
5·7	+	9·00	11·11	+	15·00

Bottom flange:

S. 2·4	−	5·00	S. 8·10	−	14·00
4·6	−	9·00	10·12	−	15·00
6·8	−	12·00	12·12	−	15·00

Vertical bracing all ties under dead load:

S. 1·2	.. .. ..	−	0·00
3·4	.. .. ..	−	5·00
5·6	.. .. ..	−	4·00
7·8	.. .. ..	−	3·00
9·10	.. .. ..	−	2·00
11·12 (vertical)	.. ..	−	1·00

Diagonal bracing all struts under dead load:

S. 2·3	.. .. ..	+	7·07
4·5	.. .. ..	+	5·65
6·7	.. .. ..	+	4·24
8·9	.. .. ..	+	2·83
10·11	.. .. ..	+	1·41
12·11 (diagonal)	.. ..	+	0·00

EVENLY DISTRIBUTED LIVE LOAD ADVANCING FROM EITHER ABUTMENT.

Maximum Stress Constants.

Top flange:				
S. 1·3	+	0·00	S. 7·9	+ 12·00
3·5	+	5·00	9·11	+ 14·00
5·7	+	9·00	11·11	+ 15·00
Bottom flange:				
S. 2·4	−	5·00	S. 8·10	− 14·00
4·6	−	9·00	10·12	− 15·00
6·8	−	12·00	12·12	− 15·00

Vertical bracing:				
S. 1·2	..	..	+	0·000
1·2	..	..	−	0·000
3·4	..	..	+	0·000
3·4	..	..	−	5·000
5·6	..	..	+	0·091
5·6	..	..	−	4·091
7·8	..	..	+	0·273
7·8	..	..	−	3·273
9·10	..	..	+	0·545
9·10	..	..	−	2·545
11·12 (vertical)	..	..	+	0·910
11·12 (vertical)	..	..	−	1·910
Diagonal bracing:				
S. 2·3	..	..	+	7·070
2·3	..	..	−	0·000
4·5	..	..	+	5·768
4·5	..	..	−	0·128
6·7	..	..	+	4·614
6·7	..	..	−	0·384
8·9	..	..	+	3·588
8·9	..	..	−	0·762

Diagonal bracing—*continued.*

10·11	+	2·693
10·11	−	1·283
12·11 (diagonal)	+	1·921
12·11 (diagonal)	−	1·921

Note.—The parts 1·2 and 1·3 are not necessary to stability.

TRUSS DIAGRAM No. 11.

LINVILLE.

CONDITIONS.

1. Depth .. .. $\frac{1}{11}$ of the span.
2. Number of panels .. .. 11.
3. Method of loading .. .. On top flange.
4. Description of bracing .. Vertical, and inclined angle 45°.

EVENLY DISTRIBUTED DEAD LOAD.

Stress Constants.

Top flange:

S. 1·3	+	0·00	S. 7·9	+	12·00
3·5	+	5·00	9·11	+	14·00
5·7	+	9·00	11·11	+	15·00

Bottom flange:

S. 2·4	−	5·00	S. 8·10	−	14·00
4·6	−	9·00	10·12	−	15·00
6·8	−	12·00	12·12	−	15·00

Vertical bracing all ties under dead load except 1·2:

S. 1·2	+	0·50
3·4	−	4·00
5·6	−	3·00
7·8	−	2·00
9·10	−	1·00
11·12 (vertical) .. .	−	0·00

Diagonal bracing all struts under dead load:

S. 2·3	..	..	..	+	7·07
4·5	..	..	..	+	5·65
6·7	..	..	..	+	4·24
8·9	..	..	..	+	2·83
10·11	.	..	..	+	1·41
12·11 (diagonal)		..	..	+	0·00

EVENLY DISTRIBUTED LIVE LOAD ADVANCING FROM EITHER ABUTMENT.

Maximum Stress Constants.

Top flange:

S. 1·3	+	0·00	S. 7·9	+	12·00
3·5	+	5·00	9·11	+	14·00
5·7	+	9·00	11·11	+	15·00

Bottom flange:

S. 2·4	−	5·00	S. 8·10	−	14·00
4·6	−	9·00	10·12	−	15·00
6·8	−	12·00	12·12	−	15·00

Vertical bracing:

S. 1·2	..	..	..	+	0·500
1·2	..	..	..	−	0·000
3·4	..	..	..	+	0·091
3·4	..	..	..	−	4·091
5·6	..	..	..	+	0·273
5·6	..	..	..	−	3·273
7·8	..	..	..	+	0·545
7·8	..	..	..	−	2·545
9·10	..	..	..	+	0·910
9·10	..	..	..	−	1·910
11·12 (vertical)		..	..	+	1·364
11·12 (vertical)		..	..	−	1·364

Diagonal bracing:

S. 2·3	..	..	..	+	7·070
2·3	..	..	..	−	0·000
4·5	..	..	..	+	5·768
4·5	..	..	..	−	0·128
6·7	..	..	..	+	4·614
6·7	..	..	..	−	0·384
8·9	..	..	..	+	3·588
8·9	..	..	..	−	0·762
10·11	..	..	..	+	2·693
10·11	..	..	..	−	1·283
12·11 (diagonal)	..	..		+	1·921
12·11 (diagonal)	..	..		−	1·921

Note.—The parts 1·3 would practically be made of the same strength as 3·5, and the parts 1·2 require particularly to be considered for axle loads.

TRUSS DIAGRAM No. 12.

LATTICE.

CONDITIONS.

1. Depth .. .. $\frac{1}{11}$ of the span.
2. Number of panels .. .. 11.
3. Method of loading .. .. On bottom flange.
4. Description of bracing .. Crossed diagonals, angle 45°.

EVENLY DISTRIBUTED DEAD LOAD.

Top flange: *Stress Constants.*

S. 1·3	+	2·75	S. 7·9	+	13·25
3·5	+	7·25	9·11	+	14·75
5·7	+	10·75	11·11	+	15·25

Bottom flange:

S. 2·4	−	2·25	S. 8·10	−	12·75
4·6	−	6·75	10·12	−	14·25
6·8	−	10·25	12·12	−	14·75

Diagonal bracing struts under dead load except 12·11:

S. 2·3	+	3·20	S. 8·9	+	1·02
4·5	+	2·43	10·11	+	0·38
6·7	+	1·79	12·11	−	0·38

Diagonal bracing ties under dead load:

S. 1·4	−	3·84	S. 7·10	−	1·79
3·6	−	3·20	9·12	−	1·02
5·8	−	2·43	11·12	−	0·38

End verticals:

S. 1·2 .. .. .. + 2·75

EVENLY DISTRIBUTED LIVE LOAD ADVANCING FROM EITHER ABUTMENT.

Maximum Stress Constants.

Top flange:

S. 1·3	+	2·75	S. 7·9	+	13·25
3·5	+	7·25	9·11	+	14·75
5·7	+	10·75	11·11	+	15·25

Bottom flange:

S. 2·4	−	2·25	S. 8·10	−	12·75
4·6	−	6·75	10·12	−	14·25
6·8	−	10·25	12·12	−	14·75

Diagonal bracing:

S. 2·3	+	3·204	S. 1·4	+	0·000
2·3	−	0·000	1·4	−	3·845
4·5	+	2·563	3·6	+	0·000
4·5	−	0·128	3·6	−	3·204
6·7	+	2·051	5·8	+	0·128
6·7	−	0·255	5·8	−	2·563
8·9	+	1·538	7·10	+	0·255
8·9	−	0·512	7·10	−	2·051

Diagonal bracing—*continued.*

10·11	+	1·153	9·12	+	0·512
10·11	−	0·768	9·12	−	1·538
12·11	+	0·768	11·12	+	0·768
12·11	−	1·153	11·12	−	1·153

End verticals:

S. 1·2	..	..	..	+	2·75

TRUSS DIAGRAM No. 13.

LATTICE.

CONDITIONS.

1. Depth .. .. $\frac{1}{11}$ of the span.
2. Number of panels .. .. 11.
3. Method of loading .. .. On top flange.
4. Description of bracing .. Crossed diagonals, angle 45°.

EVENLY DISTRIBUTED DEAD LOAD.

Stress Constants.

Top flange:

S. 1·3	+	2·25	S. 7·9	+	12·75
3·5	+	6·75	9·11	+	14·25
5·7	+	10·25	11·11	+	14·75

Bottom flange:

S. 2·4	−	2·75	S. 8·10	−	13·25
4·6	−	7·25	10·12	−	14·75
6·8	−	10·75	12·12	−	15·25

Diagonal bracing struts under dead load:

S. 2·3	+	3·84	S. 8·9	+	1·79
4·5	+	3·20	10·11	+	1·02
6·7	+	2·43	12·11	+	0·38

End verticals:

S. 1·2	..	..	..	+	2·75

Diagonal bracing ties under dead load, except 11·12:

S. 1·4	−	3·20	S. 7·10	−	1·02
3·6	−	2·43	9·12	−	0·38
5·8	−	1·79	11·12	+	0·38

EVENLY DISTRIBUTED LIVE LOAD ADVANCING FROM EITHER ABUTMENT.

Maximum Stress Constants.

Top flange:

S. 1·3	+	2·25	S. 7·9	+	12·75
3·5	+	6·75	9·11	+	14·25
5·7	+	10·25	11·11	+	14·75

Bottom flange:

S. 2·4	−	2·75	8·10	−	13·25
4·6	−	7·25	10·12	−	14·75
6·8	−	10·75	12·12	−	15·25

Diagonal bracing:

S. 2·3	+	3·845	S. 1·4	+	0·000
2·3	−	0·000	1·4	−	3·204
4·5	+	3·204	3·6	+	0·128
4·5	−	0·000	3·6	−	2·563
6·7	+	2·563	5·8	+	0·255
6·7	−	0·128	5·8	−	2·051
8·9	+	2·051	7·10	+	0·512
8·9	−	0·255	7·10	−	1·538
10·11	+	1·538	9·12	+	0·768
10·11	−	0·512	9·12	−	1·153
12·11	+	1·153	11·12	+	1·153
12·11	−	0·768	11·12	−	0·768

End verticals:

S. 1·2	..	..	..	+	2·75

TRUSS DIAGRAMS

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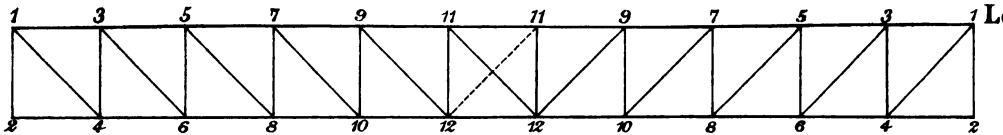
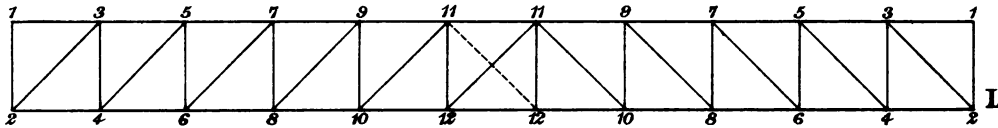


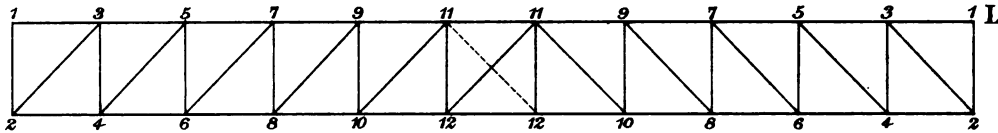
Load Line

10



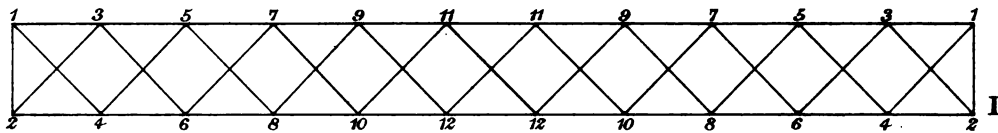
Load Line

11



Load Line

12



Load Line

E & F.N Spon, London & New York

Thos Hall & Son Lith

TRUSS DIAGRAM No. 14.

LATTICE.

CONDITIONS.

1. Depth .. .. $\frac{1}{11}$ of the span.
2. Number of panels .. .. 11.
3. Method of loading .. .. On bottom flange.
4. Description of bracing .. Verticals and crossed diagonals, angle 45°.

EVENLY DISTRIBUTED DEAD LOAD.

Stress Constants.

Top flange:

S. 1·3	+	2·50	S. 7·9	+	13·00
3·5	+	7·00	9·11	+	14·50
5·7	+	10·50	11·11	+	15·00

Bottom flange:

S. 2·4	−	2·50	8·10	−	13·00
4·6	−	7·00	10·12	−	14·50
6·8	−	10·50	12·12	−	15·00

Diagonal bracing struts under dead load:

S. 2·3	+	3·52	S. 8·9	+	1·41
4·5	+	2·82	10·11	+	0·70
6·7	+	2·11	12·11	+	0·00

Diagonal bracing ties under dead load:

S. 1·4	−	3·52	S. 7·10	−	1·41
3·6	−	2·82	9·12	−	0·70
5·8	−	2·11	11·12	−	0·00

Vertical bracing:

S. on all the verticals except 1·2 — 0·50
S. 1·2 .. .. .. + 2·50

Note.—With load top flange all stresses the same except vertical bracing.

Vertical bracing load on top flange:

S. on all the verticals except 1·2 + 0·50
S. 1·2 .. .. .. + 2·75

EVENLY DISTRIBUTED LIVE LOAD ADVANCING FROM EITHER ABUTMENT.

Maximum Stress Constants.

Top flange:

S. 1·3	+	2·50	S. 7·9	+	13·00
3·5	+	7·00	9·11	+	14·50
5·7	+	10·50	11·11	+	15·00

Bottom flange:

S. 2·4	—	2·50	S. 8·10	—	13·00
4·6	—	7·00	10·12	—	14·50
6·8	—	10·50	12·12	—	15·00

Diagonal bracing:

S. 2·3	+	3·525	S. 1·4	+	0·000
2·3	—	0·000	1·4	—	3·525
4·5	+	2·883	3·6	+	0·063
4·5	—	0·063	3·6	—	2·883
6·7	+	2·306	5·8	+	0·186
6·7	—	0·186	5·8	—	2·306
8·9	+	1·793	7·10	+	0·375
8·9	—	0·375	7·10	—	1·793
10·11	+	1·346	9·12	+	0·641
10·11	—	0·641	9·12	—	1·346
12·11	+	0·961	11·12	+	0·961
12·11	—	0·961	11·12	—	0·961

Vertical bracing:

S. on all the verticals except 1·2 — 0·50
S. 1·2 .. .. .. + 2·50

Note.—With load top flange all stresses the same except vertical bracing.

Vertical bracing load on top flange:

S. on all the verticals except 1·2 + 0·50
S. 1·2 .. .. .. + 2·75

Note.—The verticals are only supposed to distribute the load between the flanges.

TRUSS DIAGRAM No. 15.

LINVILLE.

CONDITIONS.

1. Depth .. .. $\frac{1}{10}$ of the span.
2. Number of panels .. .. 10.
3. Method of loading .. .. On bottom flange.
4. Description of bracing .. Verticals and diagonals, angle 45°.

EVENLY DISTRIBUTED DEAD LOAD.

Stress Constants.

Top flange:

S. 1·3	+	4·50	S. 7·9	+	12·00
3·5	+	8·00	9·11	+	12·50
5·7	+	10·50			

Bottom flange:

S. 2·4	—	0·00	S. 8·10	—	10·50
4·6	—	4·50	10·12	—	12·00
6·8	—	8·00			

Vertical bracing all struts under dead load:

S. 1·2	+	4·50	S. 7·8	+	1·50
3·4	+	3·50	9·10	+	0·50
5·6	+	2·50	11·12	+	0·00

Diagonal bracing all ties under dead load:

S. 1·4	−	6·34	S. 7·10	−	2·11
3·6	−	4·93	9·12	−	0·70
5·8	−	3·52			

EVENLY DISTRIBUTED LIVE LOAD ADVANCING FROM EITHER ABUTMENT.

Maximum Stress Constants.

Top flange:

S. 1·3	+	4·50	S. 7·9	+	12·00
3·5	+	8·00	9·11	+	12·50
5·7	+	10·50			

Bottom flange:

S. 2·4	−	0·00	S. 8·10	−	10·50
4·6	−	4·50	10·12	−	12·00
6·8	−	8·00			

Vertical bracing:

S. 1·2	+	4·50	S. 7·8	+	2·10
1·2	−	0·00	7·8	−	0·60
3·4	+	3·60	9·10	+	1·50
3·4	−	0·10	9·10	−	1·00
5·6	+	2·80	11·12	+	0·00
5·6	−	0·30	11·12	−	0·00

Diagonal bracing:

S. 1·4	+	0·00	S. 5·8	−	3·94
1·4	−	6·34	7·10	+	0·84
3·6	+	0·14	7·10	−	2·95
3·6	−	5·07	9·12	+	1·41
5·8	+	0·42	9·12	−	2·11

Note.—The parts 2·4 would practically be made of the same strength as 4·6 and 11·12 the same as 9·10.

TRUSS DIAGRAM No. 16.

LINVILLE.

CONDITIONS.

1. Depth .. .. $\frac{1}{10}$ of the span.
2. Number of panels .. .. 10.
3. Method of loading .. .. On top flange.
4. Description of bracing .. Verticals and diagonals, angle 45°.

EVENLY DISTRIBUTED DEAD LOAD.

Stress Constants.

Top flange:

S. 1·3	+	4·50	S. 7·9	+	12·00
3·5	+	8·00	9·11	+	12·50
5·7	+	10·50			

Bottom flange:

S. 2·4	−	0·00	S. 8·10	−	10·50
4·6	−	4·50	10·12	−	12·00
6·8	−	8·00			

Vertical bracing all struts under dead load:

S. 1·2	+	5·00	S. 7·8	+	2·50
3·4	+	4·50	9·10	+	1·50
5·6	+	3·50	11·12	+	1·00

Diagonal bracing all ties under dead load:

S. 1·4	−	6·34	S. 7·10	−	2·11
3·6	−	4·93	9·12	−	0·70
5·8	−	3·52			

EVENLY DISTRIBUTED LIVE LOAD ADVANCING FROM EITHER ABUTMENT.

Maximum Stress Constants.

Top flange:

S. 1·3	+	4·50	S. 7·9	+	12·00
3·5	+	8·00	9·11	+	12·50
5·7	+	10·50			

Bottom flange:

S. 2·4	−	0·00	S. 8·10	−	10·50
4·6	−	4·50	10·12	−	12·00
6·8	−	8·00			

Vertical bracing:

S. 1·2	+	5·00	7·8	+	2·80
1·2	−	0·00	7·8	−	0·30
3·4	+	4·50	9·10	+	2·10
3·4	−	0·00	9·10	−	0·60
5·6	+	3·60	11·12	+	1·00
5·6	−	0·10	11·12	−	0·00

Diagonal bracing:

S. 1·4	+	0·00	S. 5·8	−	3·94
1·4	−	6·34	7·10	+	0·85
3·6	+	0·14	7·10	−	2·96
3·6	−	5·07	9·12	+	1·41
5·8	+	0·42	9·12	−	2·11

Note.—If the truss is supported at the points 2·2 the parts 2·4 would practically be made of the same strength as 4·6, but if supported at the points 1·1 the parts 1·2 and 2·4 are not necessary.

TRUSS DIAGRAMS

To Face Page 40.

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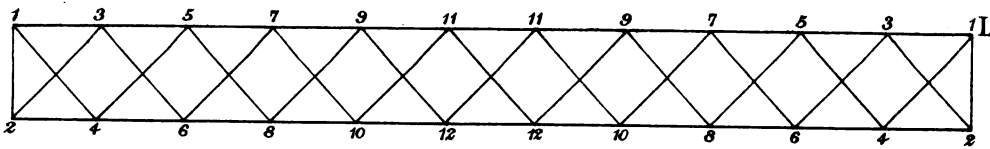

Load Line

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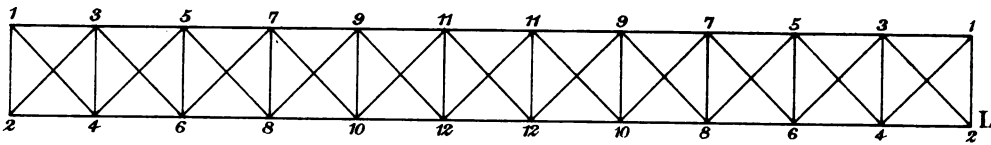

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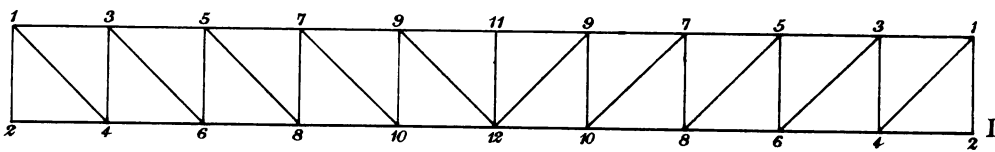

Load Line

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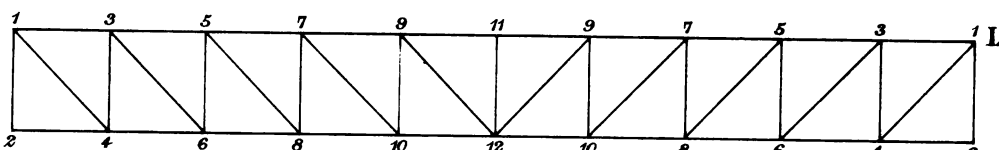

Load Line

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Thos Hall & Son Lith

TRUSS DIAGRAM No. 17.

LINVILLE.

CONDITIONS.

1. Depth .. .. $\frac{1}{10}$ of the span.
2. Number of panels .. .. 10.
3. Method of loading .. .. On bottom flange.
4. Description of bracing .. Verticals and diagonals, angle 45°.

EVENLY DISTRIBUTED DEAD LOAD.

Stress Constants.

Top flange:

S. 1·3	+	0·00	S. 7·9	+	10·50
3·5	+	4·50	9·11	+	12·00
5·7	+	8·00			

Bottom flange:

S. 2·4	−	4·50	S. 8·10	−	12·00
4·6	−	8·00	10·12	−	12·50
6·8	−	10·50			

Vertical bracing all ties under dead load:

S. 1·2	−	0·00	S. 7·8	−	2·50
3·4	−	4·50	9·10	−	1·50
5·6	−	3·50	11·12	−	1·00

Diagonal bracing all struts under dead load:

S. 2·3	+	6·34	S. 8·9	+	2·11
4·5	+	4·93	10·11	+	0·70
6·7	+	3·52			

EVENLY DISTRIBUTED LIVE LOAD ADVANCING FROM EITHER ABUTMENT.

Maximum Stress Constants.

Top flange:

S. 1·3	+	0·00	S. 7·9	+	10·50
3·5	+	4·50	9·11	+	12·00
5·7	+	8·00			

Bottom flange:

S. 2·4	−	4·50	S. 8·10	−	12·00
4·6	−	8·00	10·12	−	12·50
6·8	−	10·50			

Vertical bracing:

S. 1·2	+	0·00	S. 7·8	+	0·30
1·2	−	0·00	7·8	−	2·80
3·4	+	0·00	9·10	+	0·60
3·4	−	4·50	9·10	−	2·10
5·6	+	0·10	11·12	+	0·00
5·6	−	3·60	11·12	−	1·00

Diagonal bracing:

S. 2·3	+	6·34	S. 6·7	−	0·42
2·3	−	0·00	8·9	+	2·95
4·5	+	5·07	8·9	−	0·84
4·5	−	0·14	10·11	+	2·11
6·7	+	3·94	10·11	−	1·41

Note.—The parts 1·2 and 1·3 are not necessary to stability.

TRUSS DIAGRAM No. 18.

LINVILLE.

CONDITIONS.

1. Depth .. .. $\frac{1}{10}$ of the span.
2. Number of panels .. .. 10.
3. Method of loading .. .. On top flange.
4. Description of bracing .. Verticals and diagonals, angle 45°.

EVENLY DISTRIBUTED DEAD LOAD.

Stress Constants.

Top flange:

S. 1·3	+	0·00	S. 7·9	+	10·50
3·5	+	4·50	9·11	+	12·00
5·7	+	8·00			

Bottom flange:

S. 2·4	−	4·50	S. 8·10	−	12·00
4·6	−	8·00	10·12	−	12·50
6·8	−	10·50			

Vertical bracing all ties under dead load except 1·2:

S. 1·2	+	0·50	S. 7·8	−	1·50
3·4	−	3·50	9·10	−	0·50
5·6	−	2·50	11·12	−	0·00

Diagonal bracing all struts under dead load:

S. 2·3	+	6·34	S. 8·9	+	2·11
4·5	+	4·93	10·11	+	0·70
6·7	+	3·52			

EVENLY DISTRIBUTED LIVE LOAD ADVANCING FROM EITHER ABUTMENT.

Maximum Stress Constants.

Top flange:

S. 1·3	+	0·00	S. 7·9	+	10·50
3·5	+	4·50	9·11	+	12·00
5·7	+	8·00			

Bottom flange:

S. 2·4	−	4·50	S. 8·10	−	12·00
4·6	−	8·00	10·12	−	12·50
6·8	−	10·50			

Vertical bracing:

S. 1·2	+	0·500	S. 7·8	+	0·600
1·2	−	0·000	7·8	−	2·100
3·4	+	0·100	9·10	+	1·000
3·4	−	3·600	9·10	−	1·500
5·6	+	0·300	11·12	+	0·000
5·6	−	2·800	11·12	−	0·000

Diagonal bracing:

S. 2·3	+	6·340	S. 6·7	−	0·420
2·3	−	0·000	8·9	+	2·950
4·5	+	5·070	8·9	−	0·840
4·5	−	0·140	10·11	+	2·110
6·7	+	3·940	10·11	−	1·410.

Note.—The parts 1·3 would practically be made of the same strength as 3·5, and 11·12 the same as 9·10. The parts 1·2 require particularly to be considered for axle loads.

TRUSS DIAGRAM No. 19.

LATTICE.

CONDITIONS.

1. Depth .. .. $\frac{1}{10}$ of the span.
2. Number of panels .. .. 10.
3. Method of loading .. .. On bottom flange.
4. Description of bracing .. Crossed diagonals, angle 45°.

EVENLY DISTRIBUTED DEAD LOAD.

Stress Constants.

Top flange:

S. 1·3	+	2·50	S. 7·9	+	11·50
3·5	+	6·50	9·11	+	12·50
5·7	+	9·50			

Bottom flange:

S. 2·4	−	2·00	S. 8·10	−	11·00
4·6	−	6·00	10·12	−	12·00
6·8	−	9·00			

Diagonal bracing all struts under dead load:

S. 2·3	+	2·83	S. 8·9	+	0·70
4·5	+	2·12	10·11	+	0·00
6·7	+	1·41			

Diagonal bracing all ties under dead load:

S. 1·4	−	3·53	S. 7·10	−	1·41
3·6	−	2·83	9·12	−	0·70
5·8	−	2·12			

End verticals:

S. 1·2 .. .. .. + 2·50

EVENLY DISTRIBUTED LIVE LOAD ADVANCING FROM EITHER ABUTMENT.

Maximum Stress Constants.

Top flange:

S. 1·3	+	2·50	S. 7·9	+	11·50
3·5	+	6·50	9·11	+	12·50
5·7	+	9·50			

Bottom flange:

S. 2·4	−	2·00	S. 8·10	−	11·00
4·6	−	6·00	10·12	−	12·00
6·8	−	9·00			

Diagonal bracing:

S. 2·3	+	2·830	S. 1·4	+	0·000
2·3	−	0·000	1·4	−	3·530
4·5	+	2·260	3·6	+	0·000
4·5	−	0·140	3·6	−	2·830
6·7	+	1·690	5·8	+	0·140
6·7	−	0·280	5·8	−	2·260
8·9	+	1·270	7·10	+	0·280
8·9	−	0·570	7·10	−	1·690
10·11	+	0·840	9·12	+	0·570
10·11	−	0·840	9·12	−	1·270

End verticals:

S. 1·2	..	..	..	+	2·500
1·2	..	..	..	−	0·000

TRUSS DIAGRAM No. 20.

LATTICE.

Conditions.

1. Depth .. .. $\frac{1}{10}$ of the span.
2. Number of panels .. .. 10.
3. Method of loading .. .. On top flange.
4. Description of bracing .. Crossed diagonals, angle 45°.

Evenly distributed Dead Load.

Top flange: *Stress Constants.*

S. 1·3	+	2·00	S. 7·9	+	11·00
3·5	+	6·00	9·11	+	12·00
5·7	+	9·00			

Bottom flange:

S. 2·4	−	2·50	S. 8·10	−	11·50
4·6	−	6·50	10·12	−	12·50
6·8	−	9·50			

Diagonal bracing all struts under dead load:

S. 2·3	+	3·53	S. 8·9	+	1·41
4·5	+	2·83	10·11	+	0·70
6·7	+	2·12			

Diagonal bracing all ties under dead load:

S. 1·4	−	2·83	S. 7·10	−	0·70
3·6	−	2·12	9·12	−	0·00
5·8	−	1·41			

End verticals:

S. 1·2 .. .. .. + 2·50

EVENLY DISTRIBUTED LIVE LOAD ADVANCING FROM EITHER ABUTMENT.

Maximum Stress Constants.

Top flange:

S. 1·3	+	2·00	S. 7·9	+	11·00
3·5	+	6·00	9·11	+	12·00
5·7	+	9·00			

Bottom flange:

S. 2·4	−	2·50	S. 8·10	−	11·50
4·6	−	6·50	10·12	−	12·50
6·8	−	9·50			

Diagonal bracing:

S. 2·3·	+	3·53	S. 1·4	+	0·00
2·3	−	0·00	1·4	−	2·83
4·5	+	2·83	3·6	+	0·14
4·5	−	0·00	3·6	−	2·26
6·7	+	2·26	5·8	+	0·28
6·7	−	0·14	5·8	−	1·69
8·9	+	1·69	7·10	+	0·57
8·9	−	0·28	7·10	−	1·27
10·11	+	1·27	9·12	+	0·85
10·11	−	0·57	9·12	−	0·85

End verticals:

S. 1·2	..	..	..	+	2·50
1·2	..	..	..	−	0·00

TRUSS DIAGRAMS

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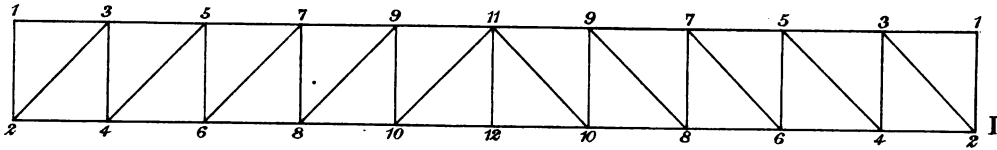
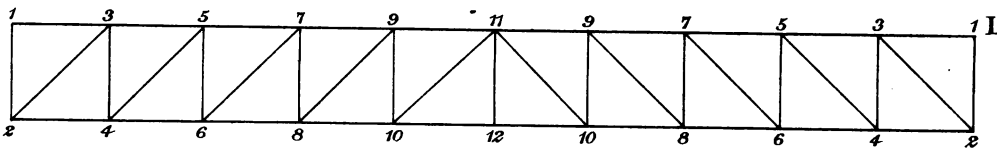


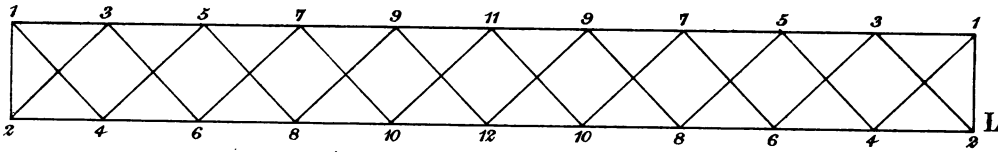
Load Line

18



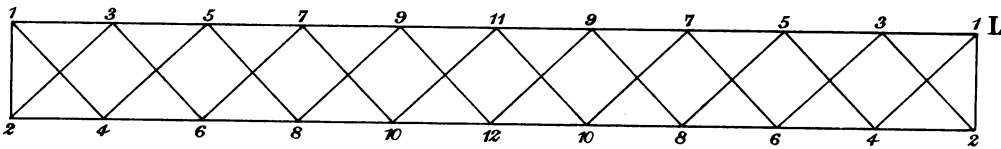
Load Line

19



Load Line

20



Load Line

E & F N Spon, London & New York

Thos Kell & Son Lith

PLATE 5

TRUSS DIAGRAM No. 21.

LATTICE.

Conditions.

1. Depth .. .. $\frac{1}{10}$ of the span.
2. Number of panels .. .. 10.
3. Method of loading .. On bottom flange.
4. Description of bracing .. Verticals and crossed diagonals. angle 45°.

Evenly distributed Dead Load.

Stress Constants.

Top flange:

S. 1·3	+	2·25	S. 7·9	+	11·25
3·5	+	6·25	9·11	+	12·25
5·7	+	9·25			

Bottom flange:

S. 2·4	−	2·25	S. 8·10	−	11·25
4·6	−	6·25	10·12	−	12·25
6·8	−	9·25			

Diagonal bracing struts under dead load:

S. 2·3	+	3·17	S. 8·9	+	1·06
4·5	+	2·47	10·11	+	0·35
6·7	+	1·76			

Diagonal bracing ties under dead load:

S. 1·4	−	3·17	S. 7·10	−	1·06
3·6	−	2·47	9·12	−	0·35
5·8	−	1·76			

Vertical bracing:

S. on all the verticals except 1·2	−	0·50
S. 1·2	+	2·25

Note.—With load top flange all stresses the same except vertical bracing.

Vertical bracing load on top flange:

S. on all the verticals except 1·2	+	0·50
S. 1·2	+	2·50

EVENLY DISTRIBUTED LIVE LOAD ADVANCING FROM EITHER ABUTMENT.

Maximum Stress Constants.

Top flange:

S. 1·3	+	2·25	S. 7·9	+	11·25
3·5	+	6·25	9·11	+	12·25
5·7	+	9·25			

Bottom flange:

S. 2·4	−	2·25	S. 8·10	−	11·25
4·6	−	6·25	10·12	−	12·25
6·8	−	9·25			

Diagonal bracing:

S. 2·3	+	3·17	S. 1·4	+	0·00
2·3	−	0·00	1·4	−	3·17
4·5	+	2·54	3·6	+	0·07
4·5	−	0·07	3·6	−	2·54
6·7	+	1·97	5·8	+	0·21
6·7	−	0·21	5·8	−	1·97
8·9	+	1·48	7·10	+	0·42
8·9	−	0·42	7·10	−	1·48
10·11	+	1·06	9·12	+	0·71
10·11	−	0·71	9·12	−	1·06

Vertical bracing:

S. on all the verticals except 1·2	−	0·50
S. 1·2	+	2·25

Note.—With load top flange all stresses the same except vertical bracing.

Vertical bracing load on top flange:

S. on all the verticals except 1·2	+	0·50
S. 1·2	+	2·50

Note.—The verticals are only supposed to distribute the load between the flanges.

TRUSS DIAGRAM No. 22.

MULTIPLE LATTICE.

CONDITIONS.

1. Depth .. .. $\frac{1}{10}$ of the span.
2. Number of panels .. .. 20.
3. Method of loading .. .. On bottom flange.
4. Description of bracing .. Multiple lattice, 45°.

EVENLY DISTRIBUTED DEAD LOAD.

Stress Constants.

Top flange:

S. 1·3	+	2·50	S. 11·13	+	20·00
3·5	+	7·00	13·15	+	22·00
5·7	+	11·00	15·17	+	23·50
7·9	+	14·50	17·19	+	24·50
9·11	+	17·50	19·21	+	25·00

Bottom flange:

S. 2·4	−	2·00	S. 12·14	−	19·50
4·6	−	6·50	14·16	−	21·50
6·8	−	10·50	16·18	−	23·00
8·10	−	14·00	18·20	−	24·00
10·12	−	17·00	20·22	−	24·50

Diagonal bracing struts under dead load except 20·19 :

S. A·3	+	3·18	S. 12·15	+	1·07
2·5	+	2·83	14·17	+	0·71
4·7	+	2·48	16·19	+	0·35
6·9	+	2·12	18·21	+	0·00
8·11	+	1·77	20·19	−	0·35
10·13	+	1·41			

Diagonal bracing ties under dead load:

S. A·4	−	3·89	S. 11·16	−	1·77
1·6	−	3·53	13·18	−	1·41
3·8	−	3·18	15·20	−	1·07
5·10	−	2·83	17·22	−	0·71
7·12	−	2·48	19·20	−	0·35
9·14	−	2·12			

End verticals:

S. 1·A	..	..	+	2·50
A·2	..	..	+	7·50

Transverse stress at A inwards .. .. 0·50

Remaining verticals:

These are merely stiffeners.

Evenly distributed Live Load advancing from either Abutment.

Maximum Stress Constants.

Top flange:

S. 1·3	+	2·50	S. 11·13	+	20·00
3·5	+	7·00	13·15	+	22·00
5·7	+	11·00	15·17	+	23·50
7·9	+	14·50	17·19	+	24·50
9·11	+	17·50	19·21	+	25·00

Bottom flange:

S. 2·4	−	2·00	S. 12·14	−	19·50
4·6	−	6·50	14·16	−	21·50
6·8	−	10·50	16·18	−	23·00
8·10	−	14·00	18·20	−	24·00
10·12	−	17·00	20·22	−	24·50

Diagonal bracing:

S. A·3	+	3·18	A·4	+	0·00
A·3	−	0·00	A·4	−	3·89
2·5	+	2·83	1·6	+	0·00
2·5	−	0·00	1·6	−	3·53
4·7	+	2·54	3·8	+	0·00
4·7	−	0·06	3·8	−	3·18
6·9	+	2·26	5·10	+	0·00
6·9	−	0·14	5·10	−	2·83
8·11	+	1·98	7·12	+	0·06
8·11	−	0·21	7·12	−	2·54
10·13	+	1·69	9·14	+	0·14
10·13	−	0·28	9·14	−	2·26
12·15	+	1·48	11·16	+	0·21
12·15	−	0·41	11·16	−	1·98
14·17	+	1·27	13·18	+	0·28
14·17	−	0·56	13·18	−	1·69
16·19	+	1·05	15·20	+	0·41
16·19	−	0·70	15·20	−	1·48
18·21	+	0·85	17·22	+	0·56
18·21	−	0·85	17·22	−	1·27
20·19	+	0·71	19·20	+	0·70
20·19	−	1·06	19·20	−	1·05

End verticals:

S. 1·A	+	2·50	S. A·2	+	7·50
1·A	−	0·00	A·2	−	0·00

Transverse stress at A inwards .. .. 0·50

Remaining verticals:

These are merely stiffeners.

TRUSS DIAGRAM No. 23.

MULTIPLE LATTICE.

Conditions.

1. Depth .. .. $\frac{1}{10}$ of the span.
2. Number of panels .. .. 20.
3. Method of loading .. .. On top flange.
4. Description of bracing .. Multiple lattice, angle 45°.

Evenly distributed Dead Load.

Stress Constants.

Top flange:

S. 1·3	+	2·00	S. 11·13	+	19·50
3·5	+	6·50	13·15	+	21·50
5·7	+	10·50	15·17	+	23·00
7·9	+	14·00	17·19	+	24·00
9·11	+	17·00	19·21	+	24·50

Bottom flange:

S. 2·4	−	2·50	S. 12·14	−	20·00
4·6	−	7·00	14·16	−	22·00
6·8	−	11·00	16·18	−	23·50
8·10	−	14·50	18·20	−	24·50
10·12	−	17·50	20·22	−	25·00

Diagonal bracing struts under dead load:

S. A·3	+	3·89	S. 12·15	+	1·77
2·5	+	3·53	14·17	+	1·41
4·7	+	3·18	16·19	+	1·07
6·9	+	2·83	18·21	+	0·71
8·11	+	2·48	20·19	+	0·35
10·13	+	2·12			

Diagonal bracing ties under dead load except 19·20:

S. A·4	–	3·18	S. 11·16	–	1·07
1·6	–	2·83	13·18	–	0·71
3·8	–	2·48	15·20	–	0·35
5·10	–	2·12	17·22	–	0·00
7·12	–	1·77	19·20	+	0·35
9·14	–	1·41			

End verticals:

S. 1·A	..	..	..	+	2·50
A·2	..	..	..	+	7·50

Transverse stress at A outwards .. 0·50

Remaining verticals:

These are merely stiffeners.

Evenly distributed Live Load advancing from either Abutment.

Maximum Stress Constants.

Top flange:

S. 1·3	+	2·00	S. 11·13	+	19·50
3·5	+	6·50	13·15	+	21·50
5·7	+	10·50	15·17	+	23·00
7·9	+	14·00	17·19	+	24·00
9·11	+	17·00	19·21	+	24·50

Bottom flange:

S. 2·4	–	2·50	S. 12·14	–	20·00
4·6	–	7·00	14·16	–	22·00
6·8	–	11·00	16·18	–	23·50
8·10	–	14·50	18·20	–	24·50
10·12	–	17·50	20·22	–	25·00

Diagonal bracing:

S. A·3	+	3·89	S. A·4	+	0·00
A·3	−	0·00	A·4	−	3·18
2·5	+	3·53	1·6	+	0·00
2·5	−	0·00	1·6	−	2·83
4·7	+	3·18	3·8	+	0·06
4·7	−	0·00	3·8	−	2·54
6·9	+	2·83	5·10	+	0·14
6·9	−	0·00	5·10	−	2·26
8·11	+	2·54	7·12	+	0·21
8·11	−	0·06	7·12	−	1·98
10·13	+	2·26	9·14	+	0·28
10·13	−	0·14	9·14	−	1·69
12·15	+	1·98	11·16	+	0·41
12·15	−	0·21	11·16	−	1·48
14·17	+	1·69	13·18	+	0·56
14·17	−	0·28	13·18	−	1·27
16·19	+	1·48	15·20	+	0·71
16·19	−	0·41	15·20	−	1·06
18·21	+	1·27	17·22	+	0·85
18·21	−	0·56	17·22	−	0·85
20·19	+	1·06	19·20	+	1·05
20·19	−	0·71	19·20	−	0·70

End verticals:

S. 1·A	+	2·50	S. A·2	+	7·50
1·A	−	0·50	A·2	−	0·00

Transverse stress at A outwards .. 0·50

Remaining verticals:

These are merely stiffeners.

TRUSS DIAGRAM No. 24.

INVERTED LINVILLE.

Conditions.

1. Depth .. .. $\frac{1}{10}$ of the span.
2. Number of panels .. .. 5.
3. Method of loading .. .. On top flange.
4. Description of bracing .. Vertical and inclined, angle 63° 26′.

Evenly distributed Dead Load.

Stress Constants.

Top flange:

S. 1·3	..	..	..	+	4·000
3·5	..	..	..	+	6·000
5·5	..	..	..	+	6·000

Bottom flange:

S. 1·2	..	..	..	−	4·472
2·4	..	..	..	−	4·000
4·4	..	..	..	−	6·000

Vertical bracing:

S. 2·3	..	..	..	+	2·000
4·5	..	..	..	+	1·000

Inclined bracing:

S. 3·4	..	..	..	−	2·236
5·4	..	..	..	−	0·000

Evenly distributed Live Load Advancing from either Abutment.

Maximum Stress Constants.

Top flange:

S. 1·3	+	4·000
3·5	+	6·000
5·5	+	6·000

Bottom flange:

S. 1·2	−	4·472
2·4	−	4·000
4·4	−	6·000

Vertical bracing:

S. 2·3	+	2·000	S. 4·5	+	1·200
2·3	−	0·000	4·5	−	0·200

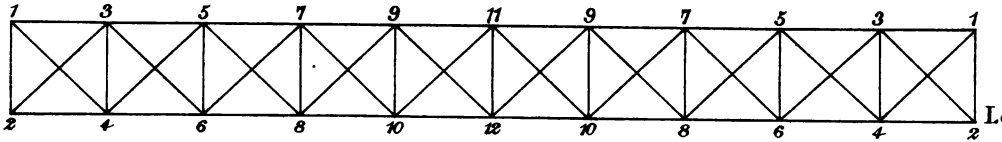
Inclined bracing:

S. 3·4	+	0·447	S. 5·4	+	1·341
3·4	−	2·683	5·4	−	1·341

Note.—In this type of truss it is usual to make the diagonals capable of sustaining tension only, and in that case, with a moving load, another diagonal would be required in the centre panel to relieve 5·4 of compression and possibly other diagonals in the side panels; but this would depend upon the relative values of the dead and live loads.

If this truss is turned upside down the stresses remain the same, but the signs + and − are reversed.

21



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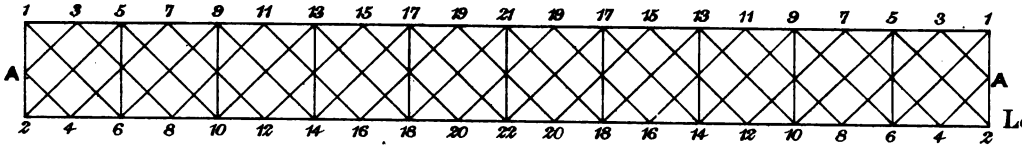

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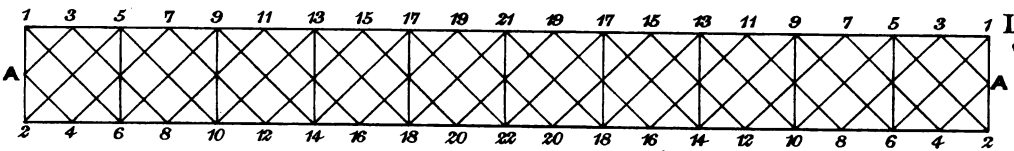

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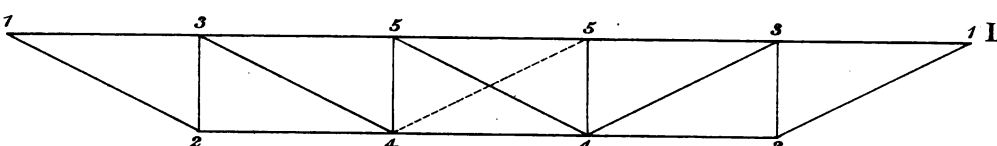

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PLATE 6

TRUSS DIAGRAM No. 25.

INVERTED LINVILLE.

Conditions.

1. Depth .. .. $\frac{1}{10}$ of the span.
2. Number of panels .. .. 6.
3. Method of loading .. .. On top flange.
4. Description of bracing .. Vertical, and inclined angle 59° 2′.

Evenly distributed Dead Load.

Stress Constants.

Top flange:

S. 1·3	..	..	..	+	4·165
3·5	..	..	..	+	6·664
5·7	..	..	..	+	7·500

Bottom flange:

S. 1·2	..	..	..	−	4·857
2·4	..	..	..	−	4·165
4·6	..	..	..	−	6·664

Vertical bracing:

S. 2·3	..	..	..	+	2·500
4·5	..	..	..	+	1·500
6·7	..	..	..	+	1·000

Inclined bracing:

S. 3·4	..	..	..	−	2·914
5·6	..	..	..	−	0·971

Evenly distributed Live Load Advancing from either Abutment.

Maximum Stress Constants.

Top flange:

S. 1·3	..	..	..	+	4·165
3·5	..	..	..	+	6·664
5·7	..	..	..	+	7·500

Bottom flange:

S. 1·2	..	..	..	−	4·857
2·4	..	..	..	−	4·165
4·6	..	..	..	−	6·664

Vertical bracing:

S. 2·3	+	2·500	S. 4·5	−	0·166
2·3	−	0·000	6·7	+	1·000
4·5	+	1·666	6·7	−	0·000

Inclined bracing:

S. 3·4	+	0·322	S. 5·6	+	0·971
3·4	−	3·237	5·6	−	1·943

Note.—In this type of truss it is usual to make the diagonals capable of sustaining tension only, and in that case with a moving load cross diagonals would be required in some of the panels, depending upon the relative values of the dead and live loads.

If this truss is turned upside down the stresses remain the same, but the signs + and − are reversed.

TRUSS DIAGRAM No. 26.

WARREN.

Conditions.

1. Depth.. .. .. Span × 0·0866.
2. Number of panels .. .. 10.
3. Method of loading .. .. On bottom flange.
4. Description of bracing .. Inclined, angle 30°.

Evenly Distributed Dead Load.

Stress Constants.

Top flange:

S. 1·3	+	5·19	S. 7·9	+	13·85
3·5	+	9·24	9·9	+	14·43
5·7	+	12·12			

Bottom flange:

S. 2·4	−	2·60	S. 8·10	−	12·99
4·6	−	7·22	10·12	−	14·14
6·8	−	10·68			

Inclined bracing struts under dead load:

S. 1·2	+	5·19	S. 7·8	+	1·73
3·4	+	4·04	9·10	+	0·57
5·6	+	2·88			

Inclined bracing ties under dead load:

S. 1·4	−	5·19	S. 7·10	−	1·73
3·6	−	4·04	9·12	−	0·57
5·8	−	2·88			

Evenly distributed Live Load Advancing from either Abutment.

Maximum Stress Constants.

Top flange:

S. 1·3	+	5·19	S. 7·9	+	13·85
3·5	+	9·24	9·9	+	14·43
5·7	+	12·12			

Bottom flange:

S. 2·4	−	2·60	S. 8·10	−	12·99
4·6	−	7·22	10·12	−	14·14
6·8	−	10·68			

Inclined bracing:

S. 1·2	+	5·197	S. 1·4	+	0·000
1·2	−	0·000	1·4	−	5·197
3·4	+	4·158	3·6	+	0·115
3·4	−	0·115	3·6	−	4·158
5·6	+	3·234	5·8	+	0·346
5·6	−	0·346	5·8	−	3·234
7·8	+	2·425	7·10	+	0·693
7·8	−	0·693	7·10	−	2·425
9·10	+	1·732	9·12	+	1·155
9·10	−	1·155	9·12	−	1·732

TRUSS DIAGRAM No. 27.

WARREN.

CONDITIONS.

1. Depth .. .. Span × 0·0866.
2. Number of panels .. .. 10.
3. Method of loading .. .. On top flange.
4. Description of bracing .. Inclined angle, 30°.

EVENLY DISTRIBUTED DEAD LOAD.

Stress Constants.

Top flange:

S. 1·3	+	0·00	S. 7·9	+	11·98
3·5	+	5·05	9·11	+	13·71
5·7	+	9·09	11·11	+	14·29

Bottom flange:

S. 2·4	−	2·74	S. 8·10	−	13·13
4·6	−	7·35	10·12	−	14·29
6·8	−	10·82			

Inclined bracing struts under dead load:

S. 2·3	+	5·46	S. 8·9	+	2·31
4·5	+	4·62	10·11	+	1·15
6·7	+	3·46			

Inclined bracing ties under dead load:

S. 3·4	−	4·62	S. 9·10	−	1·15
5·6	−	3·46	11·12	−	0·00
7·8	−	2·31			

End verticals:

S. 1·2 .. .. .. + 0·25

Evenly distributed Live Load Advancing from either Abutment.

Maximum Stress Constants.

Top flange:

S. 1·3	+	0·00	S. 7·9	+	11·98
3·5	+	5·05	9·11	+	13·71
5·7	+	9·09	11·11	+	14·29

Bottom flange:

S. 2·4	−	2·74	S. 8·10	−	13·13
4·6	−	7·35	10·12	−	14·29
6·8	−	10·82			

Inclined bracing:

S. 2·3	+	5·460	3·4	+	0·046
2·3	−	0·000	3·4	−	4·666
4·5	+	4·666	5·6	+	0·219
4·5	−	0·046	5·6	−	3·682
6·7	+	3·682	7·8	+	0·508
6·7	−	0·219	7·8	−	2·818
8·9	+	2·818	9·10	+	0·912
8·9	−	0·508	9·10	−	2·067
10·11	+	2·067	11·12	+	1·432
10·11	−	0·912	11·12	−	1·432

End verticals:

S. 1·2	..	..	..	+	0·25
1·2	..	..	..	−	0·00

Note.—The parts 1·3 would practically be made of the same strength as 3·5, and the parts 1·2 require particularly to be considered for axle loads.

TRUSS DIAGRAM No. 28.

WARREN.

CONDITIONS.

1. Depth .. .. Span × 0·0866.
2. Number of panels .. .. 10.
3. Method of loading .. .. On bottom flange.
4. Description of bracing .. Inclined angle 30°, and verticals.

EVENLY DISTRIBUTED DEAD LOAD.

Stress Constants.

Top flange:

S. 1·3	+	0·00	S. 7·9	+	12·04
3·5	+	5·12	9·11	+	13·77
5·7	+	9·16	11·11	+	14·35

Bottom flange:

S. 2·4	−	2·67	S. 8·10	−	13·05
4·6	−	7·28	10·12	−	14·21
6·8	−	10·74			

Inclined bracing struts under dead load:

S. 2·3	+	5·34	S. 8·9	+	2·02
4·5	+	4·33	10·11	+	0·87
6·7	+	3·17			

Inclined bracing ties under dead load:

S. 3·4	−	4·90	S. 9·10	−	1·44
5·6	−	3·75	11·12	−	0·29
7·8	−	2·60			

End verticals:

S. 1·2 .. .. 0·000

Remaining verticals:

S. .. .. — 0·50

EVENLY DISTRIBUTED LIVE LOAD ADVANCING FROM EITHER ABUTMENT.

Maximum Stress Constants.

Top flange:

S. 1·3	+	0·00	S. 7·9	+	12·04
3·5	+	5·12	9·11	+	13·77
5·7	+	9·16	11·11	+	14·35

Bottom flange:

S. 2·4	—	2·67	S. 8·10	—	13·05
4·6	—	7·28	10·12	—	14·21
6·8	—	10·74			

Inclined bracing:

S. 2·3	+	5·34	S. 3·4	+	0·02
2·3	—	0·00	3·4	—	4·92
4·5	+	4·40	5·6	+	0·15
4·5	—	0·07	5·6	—	3·90
6·7	+	3·42	7·8	+	0·37
6·7	—	0·25	7·8	—	2·97
8·9	+	2·54	9·10	+	0·70
8·9	—	0·52	9·10	—	2·14
10·11	+	1·77	11·12	+	1·12
10·11	—	0·90	11·12	—	1·41

End verticals:

S. 1·2	.. .. ..	0·000
1·2	.. .. ..	− 0·000

Remaining verticals:

S.	.. ..	+ 0·00
S.	.. ..	− 0·50

Note.—With load on top flange the verticals would occupy the position of the dotted lines. They are merely supposed to distribute the load between the flanges. With load on top flange the stresses in the verticals would be S. 1·2 = + 0·125 and in remaining verticals S = + 0·50. With load bottom flange the parts 1·2 and 1·3 are not required.

TRUSS DIAGRAM No. 29.

WARREN.

CONDITIONS.

1.	Depth	Span × 0·1082.
2.	Number of panels	8.
3.	Method of loading	On bottom flange.
4.	Description of bracing ..	Inclined, angle 30°.

EVENLY DISTRIBUTED DEAD LOAD.

Stress Constants.

Top flange:

S. 1·3	+	4·04	S. 5·7	+	8·66
3·5	+	6·93	7·7	+	9·24

Bottom flange:

S. 2·4	−	2·02	S. 6·8	−	7·80
4·6	−	5·48	8·10	−	8·95

Inclined bracing struts under dead load:

S. 1·2	+	4·04	S. 5·6	+	1·73
3·4	+	2·88	7·8	+	0·57

Inclined bracing ties under live load:

S. 1·4	−	4·04	S. 5·8	−	1·73
3·6	−	2·88	7·10	−	0·57

EVENLY DISTRIBUTED LIVE LOAD ADVANCING FROM EITHER ABUTMENT.

Maximum Stress Constants.

Top flange:

S. 1.3	+	4·04	S. 5·7	+	8·66
3·5	+	6·93	7·7	+	9·24

Bottom flange:

S. 2·4	−	2·02	S. 6·8	−	7·80
4·6	−	5·48	8·10	−	8·95

Inclined bracing:

S. 1·2	+	4·04	S. 1·4	+	0·00
1·2	−	0·00	1·4	−	4·04
3·4	+	3·02	3·6	+	0·14
3·4	−	0·14	3·6	−	3·02
5·6	+	2·16	5·8	+	0·43
5·6	−	0·43	5·8	−	2·16
7·8	+	1·44	7·10	+	0·87
7·8	−	0·87	7·10	−	1·44

TRUSS DIAGRAMS

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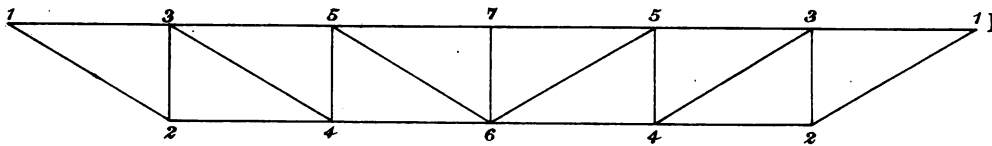
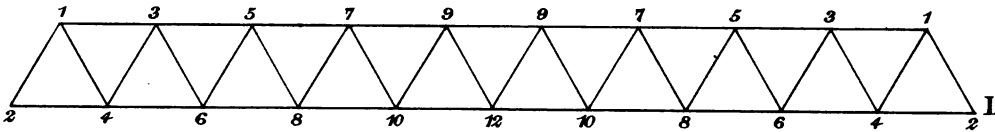


Load Line

26



Load Line

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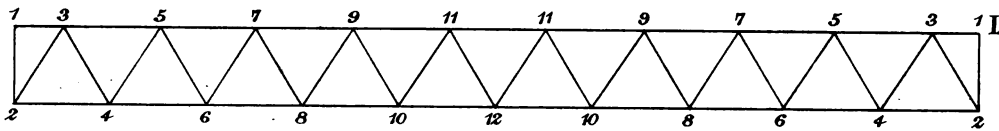
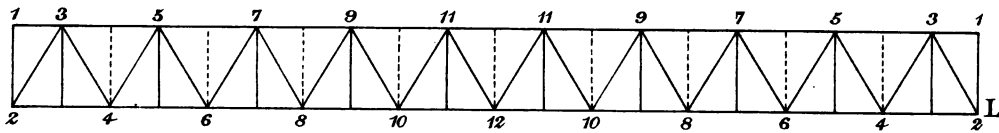


Load Line

28



Load Line

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PLATE 7

TRUSS DIAGRAM No. 30.

WARREN.

CONDITIONS.

1. Depth.. .. .. Span × 0·1082.
2. Number of panels .. .. 8.
3. Method of loading .. .. On top flange.
4. Description of bracing .. Inclined angle 30°.

EVENLY DISTRIBUTED DEAD LOAD.

Stress Constants.

Top flange:

S. 1·3	+	0·00	S. 7·9	+	8·52
3·5	+	3·89	9·9	+	9·09
5·7	+	6·78			

Bottom flange:

S. 2·4	−	2·16	S. 6·8	−	7·94
4·6	−	5·63	8·10	−	9·09

Inclined bracing struts under dead load:

S. 2·3	+	4·31	S. 6·7	+	2·31
4·5	+	3·46	8·9	+	1·15

Inclined bracing ties under dead load:

S. 3·4	−	3·46	S. 7·8	−	1·15
5·6	−	2·31	9·10	−	0·00

End verticals:

S. 1·2	,,	,,	,,	+	0·25

EVENLY DISTRIBUTED LIVE LOAD ADVANCING FROM EITHER ABUTMENT.

Maximum Stress Constants.

Top flange:

S. 1·3	+	0·00	S. 7·9	+	8·52
3·5	+	3·89	9·9	+	9·09
5·7	+	6·78			

Bottom flange:

S. 2·4	−	2·16	S. 6·8	−	7·94
4·6	−	5·63	8·10	−	9·09

Inclined bracing:

S. 2·3	+	4·31	S. 3·4	+	0·04
2·3	−	0·00	3·4	−	3·50
4·5	+	3·50	5·6	+	0·27
4·5	−	0·04	5·6	−	2·58
6·7	+	2·58	7·8	+	0·63
6·7	−	0·27	7·8	−	1·78
8·9	+	1·78	9·10	+	1·14
8·9	−	0·63	9·10	−	1·14

End verticals:

S. 1·2	..	..	..	+	0·25
1·2	..	..	..	−	0·00

Note.—The parts 1·3 would practically be made of the same strength as 3·5 and the parts 1·2 require particularly to be considered for axle loads.

TRUSS DIAGRAM No. 31.

WARREN.

CONDITIONS.

1. Depth .. .. Span × 0·1082.
2. Number of panels .. .. 8.
3. Method of loading .. .. On bottom flange.
4. Description of bracing .. Inclined angle 30°, and verticals.

EVENLY DISTRIBUTED DEAD LOAD.

Stress Constants.

Top flange:

S. 1·3	+	0·00	S. 7·9	+	8·58
3·5	+	3·96	9·9	+	9·16
5·7	+	6·85			

Bottom flange:

S. 2·4	−	2·09	S. 6·8	−	7·86
4·6	−	5·55	8·10	−	9·01

Inclined bracing struts under dead load:

S. 2·3	+	4·18	S. 6·7	+	2·02
4·5	+	3·17	8·9	+	0·87

Inclined bracing ties under dead load:

S. 3·4	−	3·75	S. 7·8	−	1·44
5·6	−	2·60	9·10	−	0·29

End verticals:

S. 1·2 .. .. .. 0·00

Remaining verticals:

S. .. .. − 0·50

EVENLY DISTRIBUTED LIVE LOAD ADVANCING FROM EITHER ABUTMENT.

Maximum Stress Constants.

Top flange:

S. 1·3	+	0·00	S. 7·9	+	8·58
3·5	+	3·96	9·9	+	9·16
5·7	+	6·85			

Bottom flange:

S. 2·4	−	2·09	S. 6·8	−	7·86
4·6	−	5·55	8·10	−	9·01

Inclined bracing:

S. 2·3	+	4·18	S. 3·4	+	0·02
2·3	−	0·00	3·4	−	3·77
4·5	+	3·27	5·6	+	0·20
4·5	−	0·10	5·6	−	2·80
6·7	+	2·37	7·8	+	0·53
6·7	−	0·35	7·8	−	1·97
8·9	+	1·61	9·10	+	1·00
8·9	−	0·74	9·10	−	1·29

End verticals:

S. 1·2	..	..	..	+	0·00
1·2	..	..	..	−	0·00

Note.—With load on top flange:

Remaining verticals:

S.	..	..	..	..	+	0·00
S.	..	..	..	..	−	0·50

Note.—With load on top flange the verticals would occupy the position of the dotted lines. They are merely supposed to distribute the load between the flanges. With load on top flange the stresses in the verticals would be S. 1·2 = + 0·125 and in remaining verticals S. + 0·50. With load bottom flange, the parts 1·2 and 1·3 are not required.

TRUSS DIAGRAM No. 32.

LINVILLE.

CONDITIONS.

1.	Depth	$\frac{1}{13}$ of the span.
2.	Number of panels	9.
3.	Method of loading	On bottom flange.
4.	Description of bracing ..	Vertical and inclined, angle 55° 18′.

EVENLY DISTRIBUTED DEAD LOAD.

Stress Constants.

Top flange:

S. 1·3	+	5·77	S. 7·9	+	14·44
3·5	+	10·11	9·9	+	14·44
5·7	+	13·00			

Bottom flange:

S. 2·4	–	0·00	S. 8·10	–	13·00
4·6	–	5·77	10·10	–	14·44
6·8	–	10·11			

Vertical bracing all struts under dead load:

S. 1·2	.. .. ..	+	4·00
3·4	.. .. ..	+	3·00
5·6	.. .. ..	+	2·00
7·8	.. .. ..	+	1·00
9·10 (vertical)	.. ..	+	0·00

Inclined bracing all ties under dead load:

S. 1·4	.. .. ..	–	7·03
3·6	.. .. ..	–	5·27
5·8	.. .. ..	–	3·51
7·10	.. .. ..	–	1·76
9·10 (diagonal)	.. ..	–	0·00

EVENLY DISTRIBUTED LIVE LOAD ADVANCING FROM EITHER ABUTMENT.

Maximum Stress Constants.

Top flange:

S. 1·3	+	5·77	S. 7·9	+	14·44
3·5	+	10·11	9·9	+	14·44
5·7	+	13·00			

Bottom flange:

S. 2·4	–	0·00	S. 8·10	–	13·00
4·6	–	5·77	10·10	–	14·44
6·8	–	10·11			

Vertical bracing:

S. 1·2	.. .. ..	+	4·000
1·2	.. .. ..	−	0·000
3·4	.. .. ..	+	3·111
3·4	.. .. ..	−	0·111
5·6	.. .. ..	+	2·333
5·6	.. .. ..	−	0·333
7·8	.. .. ..	+	1·666
7·8	.. .. ..	−	0·666
9·10 (vertical)	.. ..	+	1·111
9·10 (vertical)	.. ..	−	1·111

Inclined bracing:

S. 1·4	.. .. ..	+	0·000
1·4	.. .. ..	−	7·028
3·6	.. .. ..	+	0·195
3·6	.. .. ..	−	5·467
5·8	.. .. ..	+	0·579
5·8	.. .. ..	−	4·093
7·10	.. .. ..	+	1·159
7·10	.. .. ..	−	2·916
9·10 (diagonal)	.. ..	+	1·950
9·10 (diagonal)	.. ..	−	1·950

Note.—The parts 2·4 would practically be made of the same strength as 4·6.

TRUSS DIAGRAM No. 33.

LINVILLE.

CONDITIONS.

1. Depth .. .. $\frac{1}{15}$ of the span.
2. Number of panels .. .. 9.
3. Method of loading .. .. On top flange.
4. Description of bracing .. Vertical and inclined, angle 55° 18′.

EVENLY DISTRIBUTED DEAD LOAD.

Top flange: *Stress Constants.*

S. 1·3	+	5·77	S. 7·9	+	14·44
3·5	+	10·11	9·9	+	14·44
5·7	+	13·00			

Bottom flange:

S. 2·4	−	0·00	S. 8·10	−	13·00
4·6	−	5·77	10·10	−	14·44
6·8	−	10·11			

Vertical bracing all struts under dead load:

S. 1·2	+	4·50
3·4	+	4·00
5·6	+	3·00
7·8	+	2·00
9·10 (vertical)	+	1·00

Inclined bracing all ties under dead load:

S. 1·4	−	7·03
3·6	−	5·27
5·8	−	3·51
7·10	−	1·76
9·10 (diagonal)	−	0·00

TRUSS DIAGRAMS

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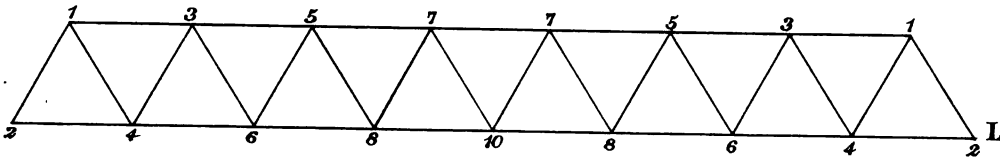
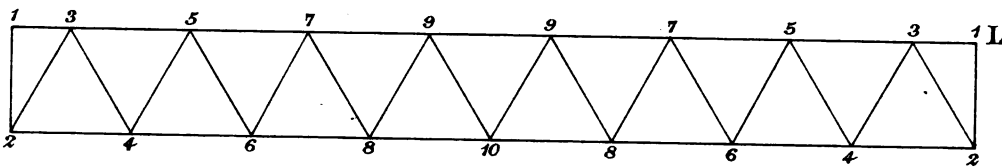


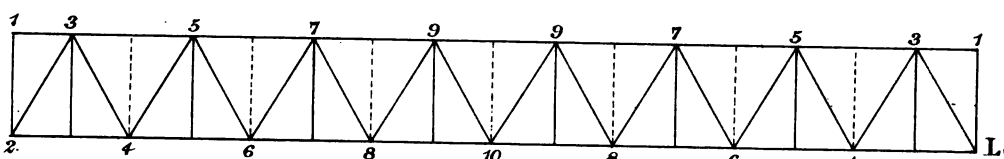
Load Line

30



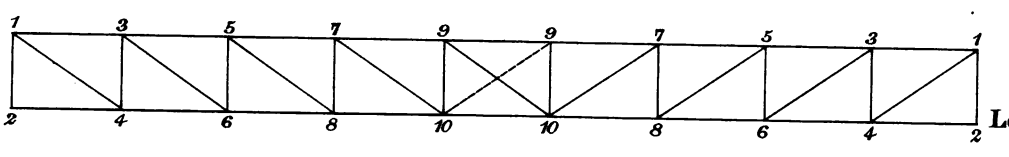
Load Line

31



Load Line

32



Load Line

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PLATE 8

EVENLY DISTRIBUTED LIVE LOAD ADVANCING FROM EITHER ABUTMENT.

Maximum Stress Constants.

Top flange:

S. 1·3	+	5·77	S. 7·9	+	14·44
3·5	+	10·11	9·9	+	14·44
5·7	+	13·00			

Bottom flange:

S. 2·4	−	0·00	S. 8·10	−	13·00
4·6	−	5·77	10·10	−	14·44
6·8	−	10·11			

Vertical bracing:

S. 1·2	..	..	+	4·500
1·2	..	..	−	0·000
3·4	..	..	+	4·000
3·4	..	..	−	0·000
5·6	..	..	+	3·111
5·6	..	..	−	0·111
7·8	..	..	+	2·333
7·8	..	..	−	0·333
9·10 (vertical)	..	..	+	1·666
9·10 (vertical)	..	..	−	0·666

Inclined bracing:

S. 1·4	..	..	+	0·000
1·4	..	..	−	7·028
3·6	..	..	+	0·195
3·6	..	..	−	5·467
5·8	..	..	+	0·579
5·8	..	..	−	4·093
7·10	..	..	+	1·159
7·10	..	..	−	2·916
9·10 (diagonal)	..	..	+	1·950
9·10 (diagonal)	..	..	−	1·950

Note.—If this truss is supported at the points 2·2 the parts 2·4 would practically be made of the same strength as 4·6, but if supported at the points 1·1 the parts 1·2 and 2·4 are not necessary.

TRUSS DIAGRAM No. 34.

GANTRY.

Conditions.

1. Depth at centre .. .. $\frac{1}{8}$ of the span.
2. Number of panels .. .. 3.
3. Method of loading .. .. On top flange.
4. Description of bracing .. Vertical and inclined, angle 69° 26′.

Evenly distributed Dead Load.

Stress Constants.

Top flange:		
S. 1·3	+	2·666
3·3	+	2·666
Bottom flange:		
S. 1·2	−	2·847
2·2	−	2·666
Vertical bracing:		
S. 2·3	+	1·000
Inclined bracing:		
S. 2·3		0·000

Evenly distributed Live Load advancing from either Abutment.

Maximum Stress Constants.

Top flange:		
S. 1·3	+	2·666
3·3	+	2·666

Bottom flange:

S. 1·2	.. .. ..	− 2·847
2·2	.. .. ..	− 2·666

Vertical bracing:

S. 2·3	.. .. ..	+ 1·000
2·3	.. .. ..	− 0·000

Inclined bracing:

S. 2·3	.. .. ..	+ 0·949
2·3	.. .. ..	− 0·949

Note.—In this type of truss it is usual to make the diagonals capable of sustaining tension only, and in that case, with a moving load, a cross diagonal would be required. If this truss is turned upside-down the stresses remain the same, but the signs + and − are reversed.

TRUSS DIAGRAM No. 35.

INVERTED LINVILLE.

CONDITIONS.

1. Depth at centre .. .. $\frac{1}{8}$ of the span.
2. Number of panels .. .. 5.
3. Method of loading .. .. On top flange.
4. Description of bracing .. Vertical and inclined, angle 58°.

EVENLY DISTRIBUTED DEAD LOAD.

Stress Constants.

Top flange:

S. 1·3	.. .. ..	+ 3·200
3·5	.. .. ..	+ 4·800
5·5	.. .. ..	+ 4·800

Bottom flange:

S. 1·2	..	..	..	−	3·774
2·4	..	..	..	−	3·200
4·4	..	..	..	−	4·800

Vertical bracing:

S. 2·3	..	..	..	+	2·000
4·5	..	..	..	+	1·000

Inclined bracing:

S. 3·4	..	..	..	−	1·887
5·4	..	..	..	−	0·000

Evenly distributed Live Load advancing from either Abutment.

Maximum Stress Constants.

Top flange:

S. 1·3	..	..	..	+	3·200
3·5	..	..	..	+	4·800
5·5	..	..	..	+	4·800

Bottom flange:

S. 1·2	..	..	..	−	3·774
2·4	..	..	..	−	3·200
4·4	..	..	..	−	4·800

Vertical bracing:

S. 2·3	+	2·000	S. 4·5	+	1·200
2·3	−	0·000	4·5	−	0·200

Inclined bracing:

S. 3·4	+	0·377	S. 5·4	+	1·132
3·4	−	2·264	5·4	−	1·132

Note.—In this type of truss it is usual to make the diagonal capable of sustaining tension only, and in that case with a moving load, cross diagonals would be required in some of the panels, depending upon the relative values of the dead and live loads. If this truss is turned upside down the stresses remain the same, but the signs + and − are reversed.

TRUSS DIAGRAM No. 36.

INVERTED LINVILLE.

Conditions.

1. Depth at centre .. .. $\frac{1}{3}$ of the span.
2. Number of panels .. 6.
3. Method of loading .. On top flange.
4. Description of bracing .. Vertical and inclined, angle 53° 8′.

Evenly distributed Dead Load.

Stress Constants.

Top flange:

S. 1·3	.. .. ..	+	3·333
3·5	.. .. ..	+	5·333
5·7	.. .. ..	+	6·000

Bottom flange:

S. 1·2	.. .. ..	−	4·165
2·4	.. .. ..	−	3·333
4·6	.. .. ..	−	5·333

Vertical bracing:

S. 2·3	..	..	..	+	2·500
4·5	..	..	..	+	1·500
6·7	..	..	..	+	1·000

Inclined bracing:

S. 3·4	..	..	..	−	2·500
5·6	..	..	..	−	0·833

EVENLY DISTRIBUTED LIVE LOAD ADVANCING FROM EITHER ABUTMENT.

Maximum Stress Constants.

Top flange:

S. 1·3	..	..	..	+	3·333
3·5	..	..	..	+	5·333
5·7	..	..	..	+	6·000

Bottom flange:

S. 1·2	..	..	..	−	4·165
2·4	..	..	..	−	3·333
4·6	..	..	..	−	5·333

Vertical bracing:

S. 2·3	+	2·500	S. 4·5	−	0·166
2·3	−	0·000	6·7	+	1·000
4·5	+	1·666	6·7	−	0·000

Inclined bracing:

S. 3·4	+	0·276	S. 5·6	+	0·833
3·4	−	2·775	5·6	−	1·666

Note.—In this type of truss it is usual to make the diagonals capable of sustaining tension only, and in that case, with a moving load, cross diagonals would

To face Page 82.

TRUSS DIAGRAMS

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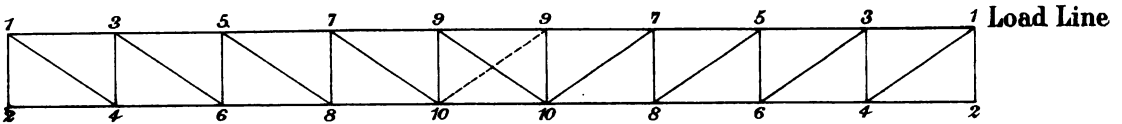
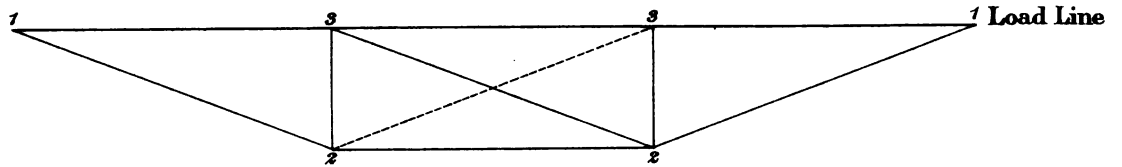


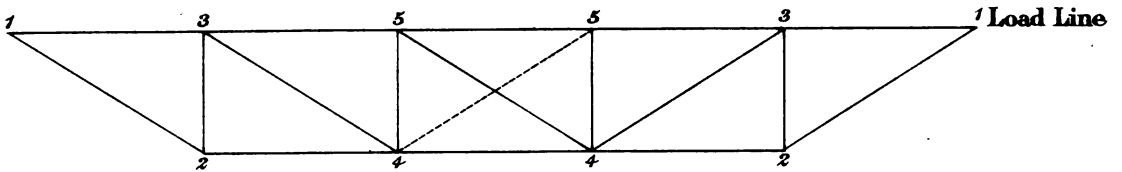
Load Line

34



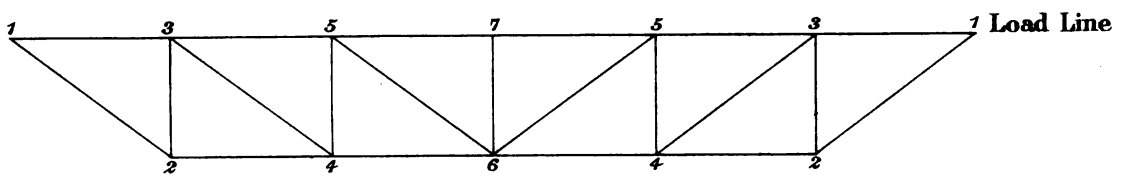
Load Line

35



Load Line

36



Load Line

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PLATE 9

be required in some of the panels, depending upon the relative values of the dead and live loads. If this truss is turned upside down the stresses remain the same, but the signs + and − are reversed.

TRUSS DIAGRAM No. 37.

PARABOLIC BOWSTRING.

CONDITIONS.

1. Depth at centre .. .. $\frac{1}{8}$ of the span.
2. Number of panels .. .. 8.
3. Method of loading .. .. On bottom flange.
4. Description of bracing .. Vertical and inclined two ways.

EVENLY DISTRIBUTED DEAD LOAD.

Stress Constants.

Top flange:

S. 2·3	+	8·73	S. 5·7	+	8·14
3·5	+	8·38	7·9	+	8·02

Bottom flange:

S. 2·4	−	8·00	S. 6·8	−	8·00
4·6	−	8·00	8·10	−	8·00

Vertical bracing:

S. 3·4	−	1·00	S. 7·8	−	1·00
5·6	−	1·00	9·10	−	1·00

Inclined bracing:

S. 3·6	0·00
5·8	0·00
7·10	0·00

EVENLY DISTRIBUTED LIVE LOAD ADVANCING FROM EITHER ABUTMENT.

Maximum Stress Constants.

Top flange:

S. 2·3	+	8·73	S. 5·7	+	8·14
3·5	+	8·38	7·9	+	8·02

Bottom flange:

S. 2·4	−	8·00	S. 6·8	−	8·00
4·6	−	8·00	8·10	−	8·00

Vertical bracing:

S. 3·4	+	0·000	S. 7·8	+	0·500
3·4	−	1·000	7·8	−	1·500
5·6	+	0·312	9·10	+	0·000
5·6	−	1·312	9·10	−	1·000

Inclined bracing:

S. 3·6	+	1·084	S. 5·8	−	1·250
3·6	−	1·084	7·10	+	1·368
5·8	+	1·250	7·10	−	1·368

TRUSS DIAGRAM No. 38.

PARABOLIC BOWSTRING.

CONDITIONS.

1. Depth at centre .. .. $\frac{1}{8}$ of the span.
2. Number of panels .. .. 8.
3. Method of loading .. .. On bottom flange.
4. Description of bracing .. Vertical and inclined one way.

EVENLY DISTRIBUTED DEAD LOAD.

Stress Constants.

Top flange:

S. 2·3	+	8·73	S. 5·7	+	8·14
3·5	+	8·38	7·9	+	8·02

Bottom flange:

S. 2·4	−	8·00	S. 6·8	−	8·00
4·6	−	8·00	8·10	−	8·00

Vertical bracing:

S. 3·4	−	1·00	S. 7·8	−	1·00
5·6	−	1·00	9·10	−	1·00

Inclined bracing:

S. 3·6	0·00	S. 9·8	0·00
5·8	0·00	7·6	0·00
7·10	0·00	5·4	0·00

EVENLY DISTRIBUTED LIVE LOAD ADVANCING FROM EITHER ABUTMENT.

Maximum Stress Constants.

Top flange:

S. 2·3	+	8·73	S. 5·7	+	8·14
3·5	+	8·38	7·9	+	8·02

Bottom flange:

S. 2·4	−	8·00	S. 6·8	−	8·00
4·6	−	8·00	8·10	−	8·00

Vertical bracing:

S. 3·4	+	0·000	S. 7·8	+	0·500
3·4	−	1·000	7·8	−	1·500
5·6	+	0·312	9·10	+	0·562
5·6	−	1·312	9·10	−	1·562

Inclined bracing:

S. 3·6	+	1·084	S. 9·8	+	1·414
3·6	−	1·084	9·8	−	1·414
5·8	+	1·250	7·6	+	1·368
5·8	−	1·250	7·6	−	1·368
7·10	+	1·368	5·4	+	1·250
7·10	−	1·368	5·4	−	1·250

TRUSS DIAGRAM No. 39.

PARABOLIC BOWSTRING.

CONDITIONS.

1. Depth at centre .. .. $\frac{1}{8}$ of the span.
2. Number of panels.. .. 8.
3. Method of loading .. On bottom flange.
4. Description of bracing.. Vertical and inclined cross bracing.

EVENLY DISTRIBUTED DEAD LOAD.

Stress Constants.

Top flange:

S. 2·3	+	8·73	S. 5·7	+	8·14
3·5	+	8·38	7·9	+	8·02

Bottom flange:

S. 2·4	−	8·00	S. 6·8	−	8·00
4·6	−	8·00	8·10	−	8·00

Vertical bracing:

S. 3·4	−	1·00	S. 7·8	−	1·00
5·6	−	1·00	9·10	−	1·00

Inclined bracing:

S. 3·6	0·00	S. 4·5	0·00
5·8	0·00	6·7	0·00
7·10	0·00	8·9	0·00

EVENLY DISTRIBUTED LIVE LOAD ADVANCING FROM EITHER ABUTMENT.

Maximum Stress Constants.

Top flange:

S. 2·3	+	8·73	S. 5·7	+	8·14
3·5	+	8·38	7·9	+	8·02

Bottom flange:

S. 2·4	−	8·00	S. 6·8	−	8·00
4·6	−	8·00	8·10	−	8·00

Vertical bracing:

S. 3·4	+	0·000	S. 7·8	+	0·500
3·4	−	1·000	7·8	−	1·000
5·6	+	0·312	9·10	+	0·562
5·6	−	1·000	9·10	−	1·000

Inclined bracing all ties with live load:

S. 3·6	−	1·084	S. 4·5	−	1·250
5·8	−	1·250	6·7	−	1·368
7·10	−	1·368	8·9	−	1·414

TRUSS DIAGRAM No. 40.

PARABOLIC BOWSTRING.

CONDITIONS.

1. Depth at centre .. .. $\frac{1}{8}$ of the span.
2. Number of panels .. 8.
3. Method of loading .. On bottom flange.
4. Description of bracing .. Vertical and inclined cross bracing.

EVENLY DISTRIBUTED DEAD LOAD.

Stress Constants.

Top flange:

S. 2·3	+	8·73	S. 5·7	+	8·14
3·5	+	8·38	7·9	+	8·02

Bottom flange:

S. 2·4	−	8·00	S. 6·8	−	8·00
4·6	−	8·00	8·10	−	8·00

Vertical bracing:

S. 3·4	−	1·00	S. 7·8	−	1·00
5·6	−	1·00	9·10	−	1·00

Inclined bracing:

S. 3·6	0·00	S. 4·5	0·00
5·8	0·00	6·7	0·00
7·10	0·00	8·9	0·00

Evenly distributed Live Load advancing from either Abutment.

Maximum Stress Constants.

Top flange:

S. 2·3	+	8·73	S. 5·7	+	8·14
3·5	+	8·38	7·9	+	8·02

Bottom flange:

S. 2·4	−	8·00	S. 4·8	−	8·00
4·6	−	8·00	8·10	−	8·00

Vertical bracing all ties with live load:

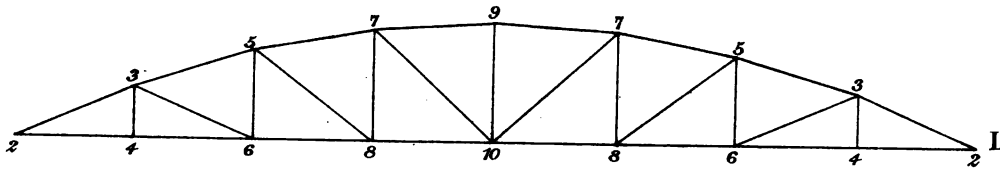
S. 3·4	−	1·000	S. 7·8	−	1·500
5·6	−	1·312	9·10	−	1·562

Inclined bracing all struts with live load:

S. 3·6	+	1·084	S. 4·5	+	1·250
5·8	+	1·250	6·7	+	1·368
7·10	+	1·368	8·9	+	1·414

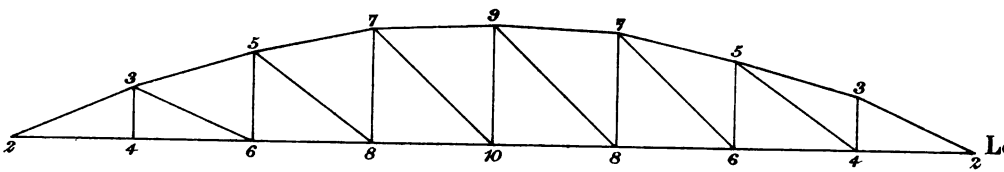
TRUSS DIAGRAMS

37



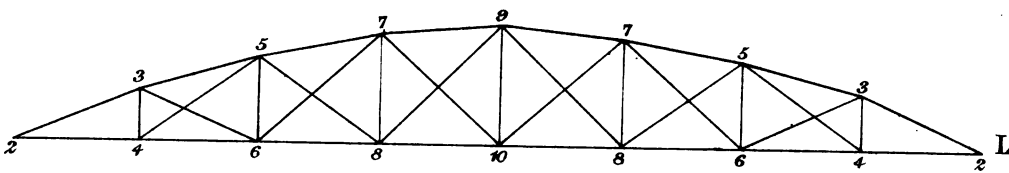
Load Line

38



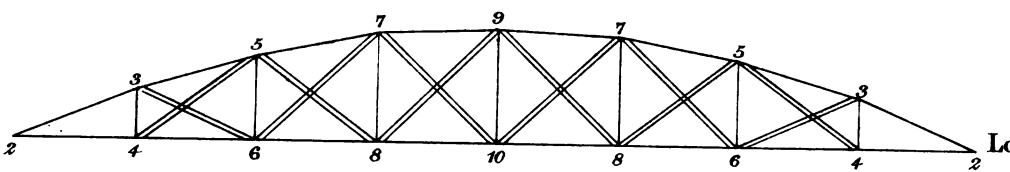
Load Line

39



Load Line

40



Load Line

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PLATE 10

TRUSS DIAGRAM No. 41.

PARABOLIC BOWSTRING.

CONDITIONS.

1. Depth at centre .. .. $\frac{1}{8}$ of the span.
2. Number of panels .. .. 12.
3. Method of loading .. .. On bottom flange.
4. Description of bracing .. Vertical and inclined two ways.

EVENLY DISTRIBUTED DEAD LOAD.

Stress Constants.

Top flange:

S. 2·3	+ 13·20	S. 7·9	+ 12·26
3·5	+ 12·82	9·11	+ 12·10
5·7	+ 12·50	11·13	+ 12·01

Bottom flange:

S. 2·4	− 12·00	S. 8·10	− 12·00
4·6	− 12·00	10·12	− 12·00
6·8	− 12·00	12·14	− 12·00

Vertical bracing:

S. 3·4	− 1·00	S. 9·10	− 1·00
5·6	− 1·00	11·12	− 1·00
7·8	− 1·00	13·14	− 1·00

Inclined bracing:

S. 3·6	0·00	S. 9·12	0·00
5·8	0·00	11·14	0·00
7·10	0·00		

Evenly distributed Live Load advancing from either Abutment.

Maximum Stress Constants.

Top flange:

S. 2·3	+	13·20	S. 7·9	+	12·26
3·5	+	12·82	9·11	+	12·10
5·7	+	12·50	11·13	+	12·01

Bottom flange:

S. 2·4	−	12·00	S. 8·10	−	12·00
4·6	−	12·00	10·12	−	12·00
6·8	−	12·00	12·14	−	12·00

Vertical bracing:

S. 3·4	+	0·000	S. 9·10	+	0·874
3·4	−	1·000	9·10	−	1·874
5·6	+	0·371	11·12	+	1·000
5·6	−	1·371	11·12	−	2·000
7·8	+	0·666	13·14	+	0·000
7·8	−	1·666	13·14	−	1·000

Inclined bracing:

S. 3·6	+	1·102	S. 7·10	−	1·505
3·6	−	1·102	9·12	+	1·666
5·8	+	1·302	9·12	−	1·666
5 8	−	1·302	11·14	+	1·768
7·10	+	1·505	11·14	−	1·768

TRUSS DIAGRAM No. 42.

PARABOLIC BOWSTRING.

CONDITIONS.

1. Depth at centre .. .. $\frac{1}{8}$ of the span.
2. Number of panels .. .. 12.
3. Method of loading .. .. On bottom flange.
4. Description of bracing .. Vertical and inclined one way.

EVENLY DISTRIBUTED DEAD LOAD.

Stress Constants.

Top flange:

S. 2·3	+	13·20	S. 7·9	+	12·26
3·5	+	12·82	9·11	+	12·10
5·7	+	12·50	11·13	+	12·01

Bottom flange:

S. 2·4	−	12·00	S. 8·10	−	12·00
4·6	−	12·00	10·12	−	12·00
6·8	−	12·00	12·14	−	12·00

Vertical bracing:

S. 3·4	−	1·00	S. 9·10	−	1·00
5·6	−	1·00	11·12	−	1·00
7·8	−	1·00	13·14	−	1·00

Inclined bracing:

S. 3·6	0·00	S. 13·12	0·00
5·8	0·00	11·10	0·00
7·10	0·00	9·8	0·00
9·12	0·00	7·6	0·00
11·14	0·00	5·4	0·00

Evenly distributed Live Load advancing from either Abutment.

Maximum Stress Constants.

Top flange:

S. 2·3	+	13·20	S. 7·9	+	12·26
3·5	+	12·82	9·11	+	12·10
5·7	+	12·50	11·13	+	12·01

Bottom flange:

S. 2·4	−	12·00	S. 8·10	−	12·00
4·6	−	12·00	10·12	−	12·00
6·8	−	12·00	12·14	−	12·00

Vertical bracing:

S. 3·4	+	0·000	S. 9·10	+	0·874
3·4	−	1·000	9·10	−	1·874
5·6	+	0·371	11·12	+	1·000
5·6	−	1·371	11·12	−	2·000
7·8	+	0·666	13·14	+	1·042
7·8	−	1·666	13·14	−	2·042

Inclined bracing:

S. 3·6	+	1·102	S. 13·12	+	1·803
3·6	−	1·102	13·12	−	1·803
5·8	+	1·302	11·10	+	1·768
5·8	−	1·302	11·10	−	1·768
7·10	+	1·505	9·8	+	1·666
7·10	−	1·505	9·8	−	1·666
9·12	+	1·666	7·6	+	1·505
9·12	−	1·666	7·6	−	1·505
11·14	+	1·768	5·4	+	1·302
11·14	−	1·768	5·4	−	1·302

TRUSS DIAGRAM No. 43.

PARABOLIC BOWSTRING.

CONDITIONS.

1. Depth at centre .. .. $\frac{1}{8}$ of the span.
2. Number of panels .. 12.
3. Method of loading .. On bottom flange.
4. Description of bracing .. Vertical and inclined cross bracing.

EVENLY DISTRIBUTED DEAD LOAD.

Stress Constants.

Top flange:

S. 2·3	+	13·20	S. 7·9	+	12·26
3·5	+	12·82	9·11	+	12·10
5·7	+	12·50	11·13	+	12·01

Bottom flange:

S. 2·4	−	12·00	S. 8·10	−	12·00
4·6	−	12·00	10·12	−	12·00
6·8	−	12·00	12·14	−	12·00

Vertical bracing:

S. 3·4	−	1·00	S. 9·10	−	1·00
5·6	−	1·00	11·12	−	1·00
7·8	−	1·00	13·14	−	1·00

Inclined bracing:

S. 3·6	0·00	S. 4·5	0·00
5·8	0·00	6·7	0·00
7·10	0·00	8·9	0·00
9·12	0·00	10·11	0·00
11·14	0·00	12·13	0·00

EVENLY DISTRIBUTED LIVE LOAD ADVANCING FROM EITHER ABUTMENT.

Maximum Stress Constants.

Top flange:

S. 2·3	+	13·20	S. 7·9	+	12·26
3·5	+	12·82	9·11	+	12·10
5·7	+	12·50	11·13	+	12·01

Bottom flange:

S. 2·4	−	12·00	S. 8·10	−	12·00
4·6	−	12·00	10·12	−	12·00
6·8	−	12·00	12·14	−	12·00

Vertical bracing:

S. 3·4	+	0·000	S. 9·10	+	0·874
3·4	−	1·000	9·10	−	1·000
5·6	+	0·371	11·12	+	1·000
5·6	−	1·000	11·12	−	1·000
7·8	+	0·666	13·14	+	1·042
7·8	−	1·000	13·14	−	1·000

Inclined bracing all ties with live load:

S. 3·6	−	1·102	S. 4·5	−	1·302
5·8	−	1·302	6·7	−	1·505
7·10	−	1·505	8·9	−	1·666
9·12	−	1·666	10·11	−	1·768
11·14	−	1·768	12·13	−	1·803

TRUSS DIAGRAM No. 44.

PARABOLIC BOWSTRING.

CONDITIONS.

1. Depth at centre .. .. $\frac{1}{8}$ of the span.
2. Number of panels .. .. 12.
3. Method of loading .. .. On bottom flange.
4. Description of bracing .. Vertical and inclined cross bracing.

EVENLY DISTRIBUTED DEAD LOAD.

Stress Constants.

Top flange:

S. 2·3	+	13·20	S. 7·9	+	12·26
3·5	+	12·82	9·11	+	12·10
5·7	+	12·50	11·13	+	12·01

Bottom flange:

S. 2·4	−	12·00	S. 8·10	−	12·00
4·6	−	12·00	10·12	−	12·00
6·8	−	12·00	12·14	−	12·00

Vertical bracing:

S. 3·4	−	1·00	S. 9·10	−	1·00
5·6	−	1·00	11·12	−	1·00
7·8	−	1·00	13·14	−	1·00

Inclined bracing:

S. 3·6	0·00	S. 4·5	0·00
5·8	0·00	6·7	0·00
7·10	0·00	8·9	0·00
9·12	0·00	10·11	0·00
11·14	0·00	12·13	0·00

Evenly distributed Live Load advancing from either Abutment.

Maximum Stress Constants.

Top flange:

S. 2·3	+	13·20	S. 7·9	+	12·26
3·5	+	12·82	9·11	+	12·10
5·7	+	12·50	11·13	+	12·01

Bottom flange:

S. 2·4	−	12·00	8·10	−	12·00
4·6	−	12·00	10·12	−	12·00
6·8	−	12·00	12·14	−	12·00

Vertical bracing all ties with live load:

S. 3·4	−	1·000	S. 9·10	−	1·874
5·6	−	1·371	11·12	−	2·000
7·8	−	1·666	13·14	−	2·042

Inclined bracing all struts with live load:

S. 3·6	+	1·102	S. 4·5	+	1·302
5·8	+	1·302	6·7	+	1·505
7·10	+	1·505	8·9	+	1·666
9·12	+	1·666	10·11	+	1·768
11·14	+	1·768	12·13	+	1·803

TRUSS DIAGRAMS

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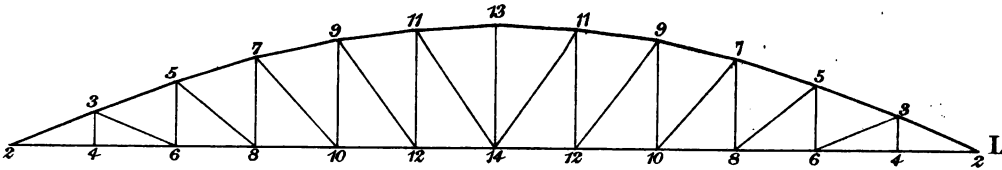
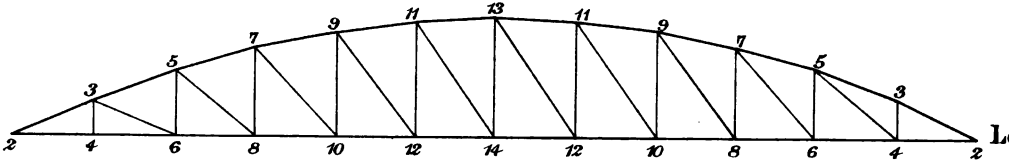


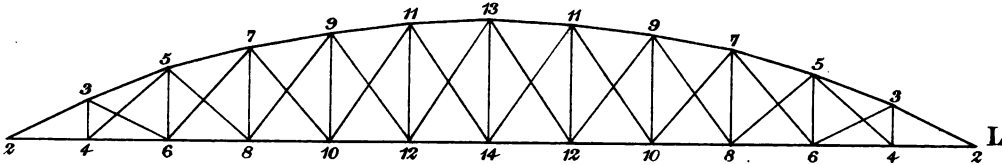
Load Line

42



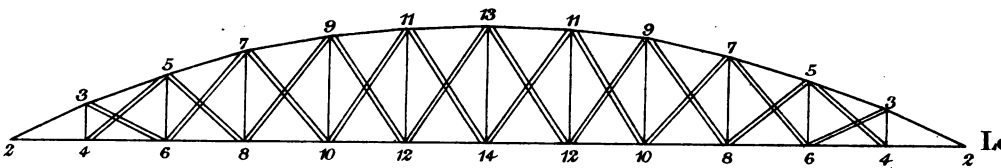
Load Line

43



Load Line

44



Load Line

E & F N Spon, London & New York

Thos Kell & Son Lith

PLATE 11

TRUSS DIAGRAM No. 45.

PARABOLIC BOWSTRING.

CONDITIONS.

1. Depth at centre .. .. $\frac{1}{8}$ of the span nearly.
2. Number of panels .. .. 13.
3. Method of loading .. .. On bottom flange.
4. Description of bracing .. Vertical, and inclined two ways.

EVENLY DISTRIBUTED DEAD LOAD.

Stress Constants.

Top flange:

S. 2·3	+	14·31	S. 9·11	+	13·16
3·5	+	13·92	11·13	+	13·04
5·7	+	13·60	13·13	+	13·08
7·9	+	13·34			

Bottom flange:

S. 2·4	−	13·08	S. 10·12	−	13·08
4·6	−	13·08	12·14	−	13·08
6·8	−	13·08	14·14	−	13·08
8·10	−	13·08			

Vertical bracing:

S. 3·4	−	1·00	S. 9·10	−	1·00
5·6	−	1·00	11·12	−	1·00
7·8	−	1·00	13·14	−	1·00

Inclined bracing:

S. 3·6	0·00	S. 9·12	0·00
5·8	0·00	11·14	0·00
7·10	0·00	13·14	0·00

EVENLY DISTRIBUTED LIVE LOAD ADVANCING FROM EITHER ABUTMENT.

Maximum Stress Constants.

Top flange:

S. 2·3	+	14·31	S. 9·11	+	13·16
3·5	+	13·92	11·13	+	13·04
5·7	+	13·60	13·13	+	13·08
7·9	+	13·34			

Bottom flange:

S. 2·4	−	13·08	S. 10·12	−	13·08
4·6	−	13·08	12·14	−	13·08
6·8	−	13·08	14·14	−	13·08
8·10	−	13·08			

Vertical bracing:

S. 3·4	+	0·000	S. 9·10	+	0·922
3·4	−	1·000	9·10	−	1·922
5·6	+	0·385	11·12	+	1·077
5·6	−	1·385	11·12	−	2·077
7·8	+	0·692	13·14	+	1·153
7·8	−	1·692	13·14	−	2·153

Inclined bracing:

S. 3·6	+	1·101	S. 9·12	+	1·708
3·6	−	1·101	9·12	−	1·708
5·8	+	1·309	11·14	+	1·835
5·8	−	1·309	11·14	−	1·835
7·10	+	1·527	13·14	+	1·900
7·10	−	1·527	13·14	−	1·900

Note.—The depth at the centre of the girder is not quite $\frac{1}{8}$th of the span, owing to the top flange, 13·13, being straight instead of curved. This causes the horizontal stress to be 13·08 instead of 13·00.

TRUSS DIAGRAM No. 46.

PARABOLIC BOWSTRING.

CONDITIONS.

1. Depth at centre .. .. $\frac{1}{8}$ of the span nearly.
2. Number of panels .. .. 13.
3. Method of loading .. .. On bottom flange.
4. Description of bracing .. Vertical, and inclined one way.

EVENLY DISTRIBUTED DEAD LOAD.

Stress Constants.

Top flange:

S. 2·3	+	14·31	S. 9·11	+	13·16
3·5	+	13·92	11·13	+	13·04
5·7	+	13·60	13·13	+	13·08
7·9	+	13·34			

Bottom flange:

S. 2·4	−	13·08	S. 10·12	−	13·08
4·6	−	13·08	12·14	−	13·08
6·8	−	13·08	14·14	−	13·08
8·10	−	13·08			

Vertical bracing:

S. 3·4	−	1·00	S. 9·10	−	1·00
5·6	−	1·00	11·12	−	1·00
7·8	−	1·00	13·14	−	1·00

Inclined bracing:

S. 3·6	0·00	S. 13·12	0·00
5·8	0·00	11·10	0·00
7·10	0·00	9·8	0·00
9·12	0·00	7·6	0·00
11·14	0·00	5·4	0·00
13·14	0·00		

EVENLY DISTRIBUTED LIVE LOAD ADVANCING FROM EITHER ABUTMENT.

Maximum Stress Constants.

Top flange:

S. 2·3	+	14·31	S. 9·11	+	13·16
3·5	+	13·92	11·13	+	13·04
5·7	+	13·60	13·13	+	13·08
7·9	+	13·34			

Bottom flange:

S. 2·4	−	13·08	S. 10·12	−	13·08
4·6	−	13·08	12·14	−	13·08
6·8	−	13·08	14·14	−	13·08
8·10	−	13·08			

Vertical bracing:

S. 3·4	+	0·000	S. 9·10	+	0·922
3·4	−	1·000	9·10	−	1·922
5·6	+	0·385	11·12	+	1·077
5·6	−	1·385	11·12	−	2·077
7·8	+	0·692	13·14	+	1·153
7·8	−	1·692	13·14	−	2·153

Inclined bracing:

S. 3·6	+	1·101	S. 9·12	−	1·708
3·6	−	1·101	11·14	+	1·835
5·8	+	1·309	11·14	−	1·835
5·8	−	1·309	13·14	+	1·900
7·10	+	1·527	13·14	−	1·900
7·10	−	1·527	13·12	+	1·900
9·12	+	1·708	13·12	−	1·900

Inclined bracing—*continued.*

S. 11·10	+	1·835	S. 7·6	+	1·527
11·10	−	1·835	7·6	−	1·527
9·8	+	1·708	5·4	+	1·309
9·8	−	1·708	5·4	−	1·309

Note.—The depth at the centre of the girder is not quite $\frac{1}{8}$th of the span, owing to the top flange, 13·13, being straight instead of curved. This causes the horizontal stress to be 13·08 instead of 13·00.

TRUSS DIAGRAM No. 47.

PARABOLIC BOWSTRING.

CONDITIONS.

1. Depth at centre .. .. $\frac{1}{8}$ of the span nearly.
2. Number of panels .. .. 13.
3. Method of loading .. .. On bottom flange.
4. Description of bracing .. Vertical and inclined cross bracing.

EVENLY DISTRIBUTED DEAD LOAD.

Stress Constants.

Top flange:

S. 2·3	+	14·31	S. 9·11	+	13·16
3·5	+	13·92	11·13	+	13·04
5·7	+	13·60	13·13	+	13·08
7·9	+	13·34			

Bottom flange:

S. 2·4	− 13·08	S. 10·12	− 13·08
4·6	− 13·08	12·14	− 13·08
6·8	− 13·08	14·14	− 13·08
8·10	− 13·08		

Vertical bracing:

S. 3·4	− 1·00	S. 9·10	− 1·00
5·6	− 1·00	11·12	− 1·00
7·8	− 1·00	13·14	− 1·00

Inclined bracing:

S. 3·6	0·00	S. 4·5	0·00
5·8	0·00	6·7	0·00
7·10	0·00	8·9	0·00
9·12	0·00	10·11	0·00
11·14	0·00	12·13	0·00
13·14	0·00	14·13	0·00

EVENLY DISTRIBUTED LIVE LOAD ADVANCING FROM EITHER ABUTMENT.

Maximum Stress Constants.

Top flange:

S. 2·3	+ 14·31	S. 9·11	+ 13·16
3·5	+ 13·92	11·13	+ 13·04
5·7	+ 13·60	13·13	+ 13·08
7·9	+ 13·34		

Bottom flange:

S. 2·4	− 13·08	S. 10·12	− 13·08
4·6	− 13·08	12·14	− 13·08
6·8	− 13·08	14·14	− 13·08
8·10	− 13·08		

Vertical bracing:

S. 3·4	+	0·000	S. 9·10	+	0·922
3·4	−	1·000	9·10	−	1·000
5·6	+	0·385	11·12	+	1·077
5·6	−	1·000	11·12	−	1·000
7·8	+	0·692	13·14	+	1·153
7·8	−	1·000	13·14	−	1·000

Inclined bracing all ties with live load:

S. 3·6	−	1·101	S. 4·5	−	1·309
5·8	−	1·309	6·7	−	1·527
7·10	−	1·527	8·9	−	1·708
9·12	−	1·708	10·11	−	1·835
11·14	−	1·835	12·13	−	1·900
13·14	−	1·900	14·13	−	1·900

Note.—The depth at the centre of the girder is not quite $\frac{1}{8}$th of the span, owing to the top flange, 13·13, being straight instead of curved. This causes the horizontal stress to be 13·08 instead of 13·00.

TRUSS DIAGRAM No. 48.

PARABOLIC BOWSTRING.

Conditions.

1. Depth at centre .. .. $\frac{1}{8}$ of the span nearly.
2. Number of panels .. .. 13.
3. Method of loading .. .. On bottom flange.
4. Description of bracing .. Vertical and inclined cross bracing.

Evenly distributed Dead Load.

Stress Constants.

Top flange:

S. 2·3	+	14·31	S. 9·11	+	13·16
3·5	+	13·92	11·13	+	13·04
5·7	+	13·60	13·13	+	13·08
7·9	+	13·34			

Bottom flange:

S. 2·4	−	13·08	S. 10·12	−	13·08
4·6	−	13·08	12·14	−	13·08
6·8	−	13·08	14·14	−	13·08
8·10	−	13·08			

Vertical bracing:

S. 3·4	−	1·00	S. 9·10	−	1·00
5·6	−	1·00	11·12	−	1·00
7·8	−	1·00	13·14	−	1·00

Inclined bracing:

S. 3·6	0·00	S. 4·5	0·00
5·8	0·00	6·7	0·00
7·10	0·00	8·9	0·00
9·12	0·00	10·11	0·00
11·14	0·00	12·13	0·00
13·14	0·00	14·13	0·00

EVENLY DISTRIBUTED LIVE LOAD ADVANCING FROM EITHER ABUTMENT.

Maximum Stress Constants.

Top flange:

S. 2·3	+	14·31	S. 9·11	+	13·16
3·5	+	13·92	11·13	+	13·04
5·7	+	13·60	13·13	+	13·08
7·9	+	13·34			

Bottom flange:

S. 2·4	−	13·08	S. 10·12	−	13·08
4·6	−	13·08	12·14	−	13·08
6·8	−	13·08	14·14	−	13·08
8·10	−	13·08			

Vertical bracing all ties with live load:

S. 3·4	−	1·000	S. 9·10	−	1·922
5·6	−	1·385	11·12	−	2·077
7·8	−	1·692	13·14	−	2·153

Inclined bracing all struts with live load:

S. 3·6	+	1·101	S. 4·5	+	1·309
5·8	+	1·309	6·7	+	1·527
7·10	+	1·527	8·9	+	1·708
9·12	+	1·708	10·11	+	1·835
11·14	+	1·835	12·13	+	1·900
13·14	+	1·900	14·13	+	1·900

Note.—The depth at the centre of the girder is not quite $\frac{1}{8}$th of the span, owing to the top flange, 13·13, being straight instead of curved. This causes the horizontal stress to be 13·08 instead of 13·00.

TRUSS DIAGRAM No. 49.

PARABOLIC BOWSTRING.

CONDITIONS.

1. Depth at centre	.. ..	$\frac{1}{8}$ of the span.
2. Number of panels	.. ..	13.
3. Method of loading	.. ..	On bottom flange.
4. Description of bracing	..	Inclined alternate ways.

EVENLY DISTRIBUTED DEAD LOAD.

Stress Constants.

Top flange:

S. 2·3	+	13·84	S. 9·11	+	13·32
3·5	+	14·46	11·13	+	13·15
5·7	+	13·92	13·15	+	13·09
7·9	+	13·57			

Bottom flange:

S. 2·4	−	12·50	S. 10·12	−	12·91
4·6	−	12·81	12·14	−	12·92
6·8	−	12·87	14·14	−	12·92
8·10	−	12·91			

Inclined bracing:

S. 3·4	−	0·8819	S. 9·10	−	0·5160
4·5	−	0·7764	10·11	−	0·5448
5·6	−	0·5616	11·12	−	0·5216
6·7	−	0·6140	12·13	−	0·5294
7·8	−	0·5275	13·14	−	0·5175
8·9	−	0·5685	14·15	−	0·5234

TRUSS DIAGRAMS

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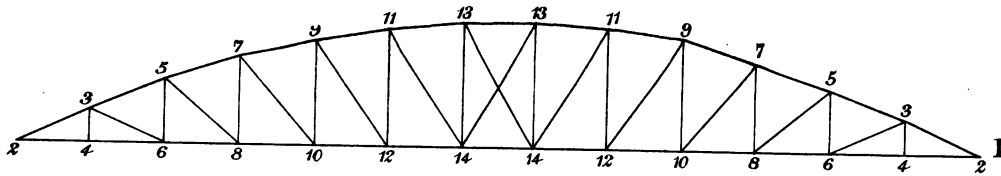
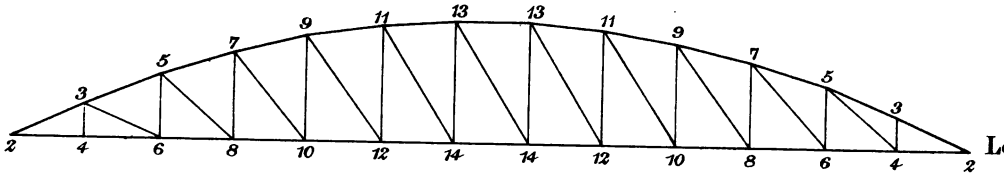


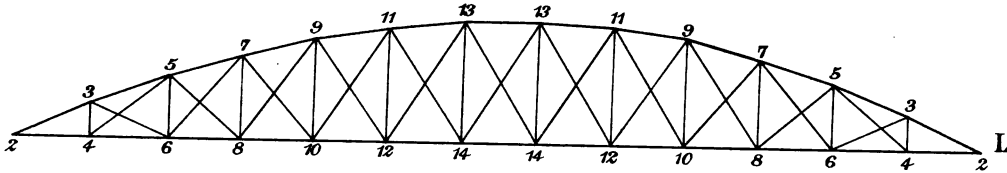
Load Line

46



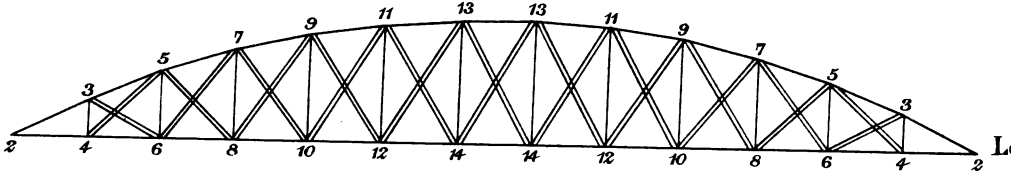
Load Line

47



Load Line

48



Load Line

E & F N Spon, London & New York

The^{s} Kell & Son Lith

PLATE 12

EVENLY DISTRIBUTED LIVE LOAD ADVANCING FROM EITHER ABUTMENT.

Maximum Stress Constants.

Top flange:

S. 2·3	+	13·84	S. 9·11	+	13·32
3·5	+	14·46	11·13	+	13·15
5·7	+	13·92	13·15	+	13·09
7·9	+	13·57			

Bottom flange:

S. 2·4	−	12·50	S. 10·12	−	12·91
4·6	−	12·81	12·14	−	12·92
6·8	−	12·87	14·14	−	12·92
8·10	−	12·91			

Inclined bracing:

S. 3·4	+	0·0000	S. 9·10	+	1·1220
3·4	−	0·8819	9·10	−	1·6380
4·5	+	0·4026	10·11	+	1·2852
4·5	−	1·1790	10·11	−	1·8300
5·6	+	0·5340	11·12	+	1·3000
5·6	−	1·0956	11·12	−	1·8216
6·7	+	0·8140	12·13	+	1·4056
6·7	−	1·4280	12·13	−	1·9350
7·8	+	0·8640	13·14	+	1·4145
7·8	−	1·3915	13·14	−	1·9320
8·9	+	1·0935	14·15	+	1·4448
8·9	−	1·6620	14·15	−	1·9782

TRUSS DIAGRAM No. 50.

PARABOLIC BOWSTRING.

Conditions.

1. Depth at centre .. .. $\frac{1}{8}$ of the span.
2. Number of panels .. .. 18.
3. Method of loading .. .. On bottom flange.
4. Description of bracing .. Vertical, and inclined two ways.

Evenly distributed Dead Load.

Stress Constants.

Top flange:

S. 2·3	+ 19·90	S. 11·13	+ 18·33
3·5	+ 19·50	13·15	+ 18·17
5·7	+ 19·15	15·17	+ 18·06
7·9	+ 18·82	17·19	+ 18·007
9·11	+ 18·55		

Bottom flange:

S. 2·4	− 18·00	S. 12·14	− 18·00
4·6	− 18·00	14·16	− 18·00
6·8	− 18·00	16·18	− 18·00
8·10	− 18·00	18·20	− 18·00
10·12	− 18·00		

Vertical bracing:

S. 3·4	− 1·00	S. 13·14	− 1·00
5·6	− 1·00	15·16	− 1·00
7·8	− 1·00	17·18	− 1·00
9·10	− 1·00	19·20	− 1·00
11·12	− 1·00		

Inclined bracing:

S. 3·6	0·00	S. 11·14	0·00
5·8	0·00	13·16	0·00
7·10	0·00	15·18	0·00
9·12	0·00	17·20	0·00

EVENLY DISTRIBUTED LIVE LOAD ADVANCING FROM EITHER ABUTMENT.

Maximum Stress Constants.

Top flange:

S. 2·3	+ 19·90	S. 11·13	+ 18·33
3·5	+ 19·50	13·15	+ 18·17
5·7	+ 19·15	15·17	+ 18·06
7·9	+ 18·82	17·19	+ 18·007
9·11	+ 18·55		

Bottom flange:

S. 2·4	− 18·00	S. 12·14	− 18·00
4·6	− 18·00	14·16	− 18·00
6·8	− 18·00	16·18	− 18·00
8·10	− 18·00	18·20	− 18·00
10·12	− 18·00		

Vertical bracing:

S. 3·4	+ 0·000	S. 11·12	− 2·332
3·4	− 1·000	13·14	+ 1·525
5·6	+ 0·414	13·14	− 2·525
5·6	− 1·414	15·16	+ 1·668
7·8	+ 0·770	15·16	− 2·668
7·8	− 1·770	17·18	+ 1·750
9·10	+ 1·085	17·18	− 2·750
9·10	− 2·085	19·20	+ 0·000
11·12	+ 1·332	19·20	− 1·000

Inclined bracing:

S. 3·6	+	1·106	S. 11·14	+	2·064
3·6	−	1·106	11·14	−	2·064
5·8	+	1·338	13·16	+	2·237
5·8	−	1·338	13·16	−	2·237
7·10	+	1·601	15·18	+	2·360
7·10	−	1·601	15·18	−	2·360
9·12	+	1·852	17·20	+	2·439
9·12	−	1·852	17·20	−	2·439

TRUSS DIAGRAM No. 51.

PARABOLIC BOWSTRING.

CONDITIONS.

1. Depth at centre .. .. $\frac{1}{8}$ of the span.
2. Number of panels .. .. 18.
3. Method of loading .. .. On bottom flange.
4. Description of bracing .. Vertical, and inclined one way.

EVENLY DISTRIBUTED DEAD LOAD.

Stress Constants.

Top flange:

S. 2·3	+	19·90	S. 11·13	+	18·33
3·5	+	19·50	13·15	+	18·17
5·7	+	19·15	15·17	+	18·06
7·9	+	18·82	17·19	+	18·007
9·11	+	18·55			

Bottom flange:

S. 2·4	–	18·00	S. 12·14	–	18·00
4·6	–	18·00	14·16	–	18·00
6·8	–	18·00	16·18	–	18·00
8·10	–	18·00	18·20	–	18·00
10·12	–	18·00			

Vertical bracing:

S. 3·4	–	1·00	S. 13·14	–	1·00
5·6	–	1·00	15·16	–	1·00
7·8	–	1·00	17·18	–	1·00
9·10	–	1·00	19·20	–	1·00
11·12	–	1·00			

Inclined bracing:

S. 3·6	0·00	S. 19·18	0·00
5·8	0·00	17·16	0·00
7·10	0·00	15·14	0·00
9·12	0·00	13·12	0·00
11·14	0·00	11·10	0·00
13·16	0·00	9·8	0·00
15·18	0·00	7·6	0·00
17·20	0·00	5·4	0·00

EVENLY DISTRIBUTED LIVE LOAD ADVANCING FROM EITHER ABUTMENT.

Maximum Stress Constants.

Top flange:

S. 2·3	+	19·90	S. 11·13	+	18·33
3·5	+	19·50	13·15	+	18·17
5·7	+	19·15	15·17	+	18·06
7·9	+	18·82	17·19	+	18·007
9·11	+	18·55			

Bottom flange:

S.	2·4	− 18·00	S.	12·14	− 18·00
	4·6	− 18·00		14·16	− 18·00
	6·8	− 18·00		16·18	− 18·00
	8·10	− 18·00		18·20	− 18·00
	10·12	− 18·00			

Vertical bracing:

S.	3·4	+ 0·000	S.	11·12	− 2·332
	3·4	− 1·000		13·14	+ 1·525
	5·6	+ 0·414		13·14	− 2·525
	5·6	− 1·414		15·16	+ 1·668
	7·8	+ 0·770		15·16	− 2·668
	7·8	− 1·770		17·18	+ 1·750
	9·10	+ 1·085		17·18	− 2·750
	9·10	− 2·085		19·20	+ 1·778
	11·12	+ 1·332		19·20	− 2·778

Inclined bracing:

S.	3·6	+ 1·106	S.	19·18	+ 2·463
	3·6	− 1·106		19·18	− 2·463
	5·8	+ 1·338		17·16	+ 2·439
	5·8	− 1·338		17·16	− 2·439
	7·10	+ 1·601		15·14	+ 2·360
	7·10	− 1·601		15·14	− 2·360
	9·12	+ 1·852		13·12	+ 2·237
	9·12	− 1·852		13·12	− 2·237
	11·14	+ 2·064		11·10	+ 2·064
	11·14	− 2·064		11·10	− 2·064
	13·16	+ 2·237		9·8	+ 1·852
	13·16	− 2·237		9·8	− 1·852
	15·18	+ 2·360		7·6	+ 1·601
	15·18	− 2·360		7·6	− 1·601
	17·20	+ 2·439		5·4	+ 1·338
	17·20	− 2·439		5·4	− 1·338

TRUSS DIAGRAM No. 52.

PARABOLIC BOWSTRING.

CONDITIONS.

1. Depth at centre .. .. $\frac{1}{6}$ of the span.
2. Number of panels .. .. 18.
3. Method of loading .. .. On bottom flange.
4. Description of bracing .. Vertical and inclined cross bracing.

EVENLY DISTRIBUTED DEAD LOAD.

Stress Constants.

Top flange:

S. 2·3	+	19·90	S. 11·13	+	18·33
3·5	+	19·50	13·15	+	18·17
5·7	+	19·15	15·17	+	18·06
7·9	+	18·82	17·19	+	18·007
9·11	+	18·55			

Bottom flange:

S. 2·4	−	18·00	S. 12·14	−	18·00
4·6	−	18·00	14·16	−	18·00
6·8	−	18·00	16·18	−	18·00
8·10	−	18·00	18·20	−	18·00
10·12	−	18·00			

Vertical bracing:

S. 3·4	−	1·00	S. 13·14	−	1·00
5·6	−	1·00	15·16	−	1·00
7·8	−	1·00	17·18	−	1·00
9·10	−	1·00	19·20	−	1·00
11·12	−	1·00			

Inclined bracing:

S. 3·6	0·00	S. 4·5	0·00
5·8	0·00	6·7	0·00
7·10	0·00	8·9	0·00
9·12	0·00	10·11	0·00
11·14	0·00	12·13	0·00
13·16	0·00	14·15	0·00
15·18	0·00	16·17	0·00
17·20	0·00	18·19	0·00

Evenly distributed Live Load advancing from either Abutment.

Maximum Stress Constants.

Top flange:

S. 2·3	+ 19·90	S. 11·13	+ 18·33
3·5	+ 19·50	13·15	+ 18·17
5·7	+ 19·15	15·17	+ 18·06
7·9	+ 18·82	17·19	+ 18·007
9·11	+ 18·55		

Bottom flange:

S. 2·4	− 18·00	S. 12·14	− 18·00
4·6	− 18·00	14·16	− 18·00
6·8	− 18·00	16·18	− 18·00
8·10	− 18·00	18·20	− 18·00
10·12	− 18·00		

Vertical bracing:

S. 3·4	+	0·000	S. 11·12	−	1·000
3·4	−	1·000	13·14	+	1·525
5·6	+	0·414	13·14	−	1·000
5·6	−	1·000	15·16	+	1·668
7·8	+	0·770	15·16	−	1·000
7·8	−	1·000	17·18	+	1·750
9·10	+	1·085	17·18	−	1·000
9·10	−	1·000	19·20	+	1·778
11·12	+	1·332	19·20	−	1·000

Inclined bracing all ties with live load:

S. 3·6	−	1·106	S. 4·5	−	1·338
5·8	−	1·338	6·7	−	1·601
7·10	−	1·601	8·9	−	1·852
9·12	−	1·852	10·11	−	2·064
11·14	−	2·064	12·13	−	2·237
13·16	−	2·237	14·15	−	2·360
15·18	−	2·360	16·17	−	2·439
17·20	−	2·439	18·19	−	2·463

TRUSS DIAGRAM No. 53.

PARABOLIC BOWSTRING.

CONDITIONS.

1. Depth at centre .. .. $\frac{1}{6}$ of the span.
2. Number of panels .. .. 18.
3. Method of loading .. .. On bottom flange.
4. Description of bracing .. Vertical and inclined cross bracing.

EVENLY DISTRIBUTED DEAD LOAD.

Stress Constants.

Top flange:

S. 2·3	+	19·90	S. 11·13	+	18·33
3·5	+	19·50	13·15	+	18·17
5·7	+	19·15	15·17	+	18·06
7·9	+	18·82	17·19	+	18·007
9·11	+	18·55			

Bottom flange:

S. 2·4	−	18·00	S. 12·14	−	18·00
4·6	−	18·00	14·16	−	18·00
6·8	−	18·00	16·18	−	18·00
8·10	−	18·00	18·20	−	18·00
10·12	−	18·00			

Vertical bracing:

S. 3·4	−	1·00	S. 13·14	−	1·00
5·6	−	1·00	15·16	−	1·00
7·8	−	1·00	17·18	−	1·00
9·10	−	1·00	19·20	−	1·00
11·12	−	1·00			

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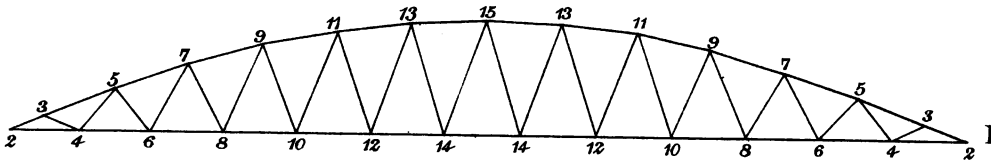
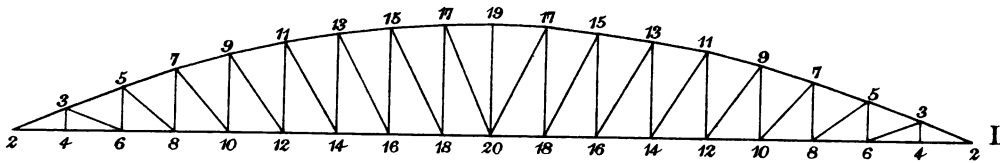
TRUSS DIAGRAMS

49



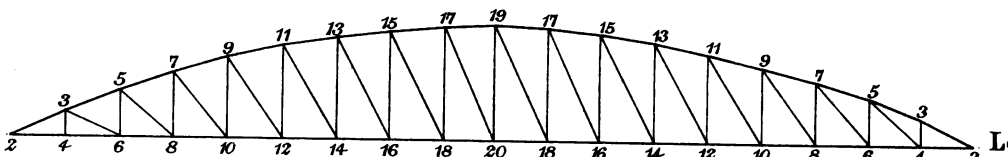
Load Line

50



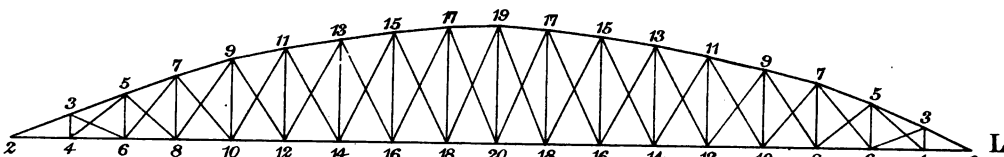
Load Line

51



Load Line

52



Load Line

E & F.N Spon, London & New York

Lnᵒˢ Kell & Son Lith

PLATE 13

Inclined bracing:

S. 3·6	0·00	S. 4·5	0·00
5·8	0·00	6·7	0·00
7·10	0·00	8·9	0·00
9·12	0·00	10·11	0·00
11·14	0·00	12·13	0·00
13·16	0·00	14·15	0·00
15·18	0·00	16·17	0·00
17·20	0·00	18·19	0·00

EVENLY DISTRIBUTED LIVE LOAD ADVANCING FROM EITHER ABUTMENT.

Maximum Stress Constants.

Top flange:

S. 2·3	+ 19·90	S. 11·13	+ 18·33
3·5	+ 19·50	13·15	+ 18·17
5·7	+ 19·15	15·17	+ 18·06
7·9	+ 18·82	17·19	+ 18·007
9·11	+ 18·55		

Bottom flange:

S. 2·4	− 18·00	S. 12·14	− 18·00
4·6	− 18·00	14·16	− 18·00
6·8	− 18·00	16·18	− 18·00
8·10	− 18·00	18·20	− 18·00
10·12	− 18·00		

Vertical bracing all ties with live load:

S. 3·4	− 1·000	S. 13·14	− 2·525
5·6	− 1·414	15·16	− 2·668
7·8	− 1·770	17·18	− 2·750
9·10	− 2·085	19·20	− 2·778
11·12	− 2·332		

Inclined bracing all struts with live load:

S. 3·6	+	1·106	S. 4·5	+	1·338
5·8	+	1·338	6·7	+	1·601
7·10	+	1·601	8·9	+	1·852
9·12	+	1·852	10·11	+	2·064
11·14	+	2·064	12·13	+	2·237
13·16	+	2·237	14·15	+	2·360
15·18	+	2·360	16·17	+	2·439
17·20	+	2·439	18·19	+	2·463

TRUSS DIAGRAM No. 54.

MULTIPLE LINVILLE.

CONDITIONS.

1. Depth .. .. $\frac{1}{8}$ of the span.
2. Number of panels .. .. 16.
3. Method of loading .. .. On top flange.
4. Description of bracing .. Vertical and inclined one way.

EVENLY DISTRIBUTED DEAD LOAD.

Stress Constants.

Top flange:

S. 1·3	+	5·50	S. 17·19	+	15·50
3·5	+	8·50	19·21	+	14·50
5·7	+	11·00	21·23	+	13·00
7·9	+	13·00	23·25	+	11·00
9·11	+	14·50	25·27	+	8·50
11·13	+	15·50	27·29	+	5·50
13·15	+	16·00	29·31	+	2·00
15·17	+	16·00	31·33	+	0·00

Bottom flange:

S. 2·4	–	0·00	S. 18·20	–	16·00
4·6	–	2·00	20·22	–	16·00
6·8	–	5·50	22·24	–	15·50
8·10	–	8·50	24·26	–	14·50
10·12	–	11·00	26·28	–	13·00
12·14	–	13·00	28·30	–	11·00
14·16	–	14·50	30·32	–	8·50
16·18	–	15·50	32·34	–	5·50

Vertical bracing:

S. 1·2	+	8·00	S. 19·20		0·00
3·4	+	4·00	21·22	–	0·50
5·6	+	3·50	23·24	–	1·00
7·8	+	3·00	25·26	–	1·50
9·10	+	2·50	27·28	–	2·00
11·12	+	2·00	29·30	–	2·50
13·14	+	1·50	31·32	–	3·00
15·16	+	1·00	33·34	+	0·50
17·18	+	0·50			

Inclined bracing:

S. 1·4	–	4·48	S. 17·22	+	0·71
1·6	–	4·94	19·24	+	1·41
3·8	–	4·23	21·26	+	2·12
5·10	–	3·53	23·28	+	2·82
7·12	–	2·82	25·30	+	3·53
9·14	–	2·12	27·32	+	4·23
11·16	–	1·41	29·34	+	4·94
13·18	–	0·71	31·34	+	4·48
15·20		0·00			

EVENLY DISTRIBUTED LIVE LOAD ADVANCING FROM EITHER ABUTMENT.

Maximum Stress Constants.

Top flange:

S. 1·3	+	5·50	S. 17·19	+	15·50
3·5	+	8·50	19·21	+	14·50
5·7	+	11·00	21·23	+	13·00
7·9	+	13·00	23·25	+	11·00
9·11	+	14·50	25·27	+	8·50
11·13	+	15·50	27·29	+	5·50
13·15	+	16·00	29·31	+	2·00
15·17	+	16·00	31·33	+	0·00

Bottom flange:

S. 2·4	−	0·00	S. 18·20	−	16·00
4·6	−	2·00	20·22	−	16·00
6·8	−	5·50	22·24	−	15·50
8·10	−	8·50	24·26	−	14·50
10·12	−	11·00	26·28	−	13·00
12·14	−	13·00	28·30	−	11·00
14·16	−	14·50	30·32	−	8·50
16·18	−	15·50	32·34	−	5·50

Vertical bracing:

S. 1·2	+	8·000	S. 9·10	+	2·625
1·2	−	0·000	9·10	−	0·125
3·4	+	4·000	11·12	+	2·250
3·4	−	0·000	11·12	−	0·250
5·6	+	3·500	13·14	+	1·875
5·6	−	0·000	13·14	−	0·375
7·8	+	3·063	15·16	+	1·563
7·8	−	0·063	15·16	−	0·563

Vertical bracing—*continued:*

S. 17·18	+	1·250	S. 25·26	−	1·875
17·18	−	0·750	27·28	+	0·250
19·20	+	1·000	27·28	−	2·250
19·20	−	1·000	29·30	+	0·125
21·22	+	0·750	29·30	−	2·625
21·22	−	1·250	31·32	+	0·062
23·24	+	0·563	31·32	−	3·062
23·24	−	1·563	33·34	+	0·500
25·26	+	0·375	33·34	−	0·000

Inclined bracing:

S. 1·4	+	0·000	S. 15·20	−	1·414
1·4	−	4·480	17·22	+	1·762
1·6	+	0·000	17·22	−	1·057
1·6	−	4·935	19·24	+	2·203
3·8	+	0·088	19·24	−	0·793
3·8	−	4·318	21·26	+	2·643
5·10	+	0·176	21·26	−	0·528
5·10	−	3·701	23·28	+	3·172
7·12	+	0·352	23·28	−	0·352
7·12	−	3·172	25·30	+	3·701
9·14	+	0·528	25·30	−	0·176
9·14	−	2·643	27·32	+	4·318
11·16	+	0·793	27·32	−	0·088
11·16	−	2·203	29·34	+	4·935
13·18	+	1·057	29·34	−	0·000
13·18	−	1·762	31·34	+	4·480
15·20	+	1·414	31·34	−	0·000

Note.—The stresses in the bracing when inclined opposite ways from the centre can easily be determined from these constants, also the stresses in counterbraces if these are added in some of the panels. The parts 2·4 would practically be made of the same strength as 4·6, and 33·34 require particularly to be considered for axle loads.

TRUSS DIAGRAM No. 55.

MULTIPLE LINVILLE.

CONDITIONS.

1. Depth .. .. $\frac{1}{10}$ of the span.
2. Number of panels .. .. 20.
3. Method of loading .. .. On top flange.
4. Description of bracing .. Vertical and inclined one way.

EVENLY DISTRIBUTED DEAD LOAD.

Stress Constants.

Top flange:

S. 1·3	+	7·00	S. 21·23	+	24·50
3·5	+	11·00	23·25	+	23·50
5·7	+	14·50	25·27	+	22·00
7·9	+	17·50	27·29	+	20·00
9·11	+	20·00	29·31	+	17·50
11·13	+	22·00	31·33	+	14·50
13·15	+	23·50	33·35	+	11·00
15·17	+	24·50	35·37	+	7·00
17·19	+	25·00	37·39	+	2·50
19·21	+	25·00	39·41	+	0·00

Bottom flange:

S. 2·4	−	0·00	S. 22·24	−	25·00
4·6	−	2·50	24·26	−	25·00
6·8	−	7·00	26·28	−	24·50
8·10	−	11·00	28·30	−	23·50
10·12	−	14·50	30·32	−	22·00
12·14	−	17·50	32·34	−	20·00
14·16	−	20·00	34·36	−	17·50
16·18	−	22·00	36·38	−	14·50
18·20	−	23·50	38·40	−	11·00
20·22	−	24·50	40·42	−	7·00

Vertical bracing:

S. 1·2	+	10·00	S. 23·24		0·00
3·4	+	5·00	25·26	−	0·50
5·6	+	4·50	27·28	−	1·00
7·8	+	4·00	29·30	−	1·50
9·10	+	3·50	31·32	−	2·00
11·12	+	3·00	33·34	−	2·50
13·14	+	2·50	35·36	−	3·00
15·16	+	2·00	37·38	−	3·50
17·18	+	1·50	39·40	−	4·00
19·20	+	1·00	41·42	+	0·50
21·22	+	0·50			

Inclined bracing:

S. 1·4	−	5·60	S. 21·26	+	0·70
1·6	−	6·34	23·28	+	1·41
3·8	−	5·64	25·30	+	2·11
5·10	−	4·93	27·32	+	2·82
7·12	−	4·23	29·34	+	3·52
9·14	−	3·52	31·36	+	4·23
11·16	−	2·82	33·38	+	4·93
13·18	−	2·11	35·40	+	5·64
15·20	−	1·41	37·42	+	6·34
17·22	−	0·70	39·42	+	5·60
19·24		0·00			

EVENLY DISTRIBUTED LIVE LOAD ADVANCING FROM EITHER ABUTMENT.

Maximum Stress Constants.

Top flange:

S. 1·3	+	7·00	S. 7·9	+	17·50
3·5	+	11·00	9·11	+	20·00
5·7	+	14·50	11·13	+	22·00

Top flange—*continued*:

S.	13·15	+ 23·50	S.	27·29	+ 20·00
	15·17	+ 24·50		29·31	+ 17·50
	17·19	+ 25·00		31·33	+ 14·50
	19·21	+ 25·00		33·35	+ 11·00
	21·23	+ 24·50		35·37	+ 7·00
	23·25	+ 23·50		37·39	+ 2·50
	25·27	+ 22·00		39·41	+ 0·00

Bottom flange:

S.	2·4	− 0·00	S.	22·24	− 25·00
	4·6	− 2·50		24·26	− 25·00
	6·8	− 7·00		26·28	− 24·50
	8·10	− 11·00		28·30	− 23·50
	10·12	− 14·50		30·32	− 22·00
	12·14	− 17·50		32·34	− 20·00
	14·16	− 20·00		34·36	− 17·50
	16·18	− 22·00		36·38	− 14·50
	18·20	− 23·50		38·40	− 11·00
	20·22	− 24·50		40·42	− 7·00

Vertical bracing:

S.	1·2	+ 10·00	S.	15·16	+ 2·45
	1·2	− 0·00		15·16	− 0·45
	3·4	+ 5·00		17·18	+ 2·10
	3·4	− 0·00		17·18	− 0·60
	5·6	+ 4·50		19·20	+ 1·80
	5·6	− 0·00		19·20	− 0·80
	7·8	+ 4·05		21·22	+ 1·50
	7·8	− 0·05		21·22	− 1·00
	9·10	+ 3·60		23·24	+ 1·25
	9·10	− 0·10		23·24	− 1·25
	11·12	+ 3·20		25·26	+ 1·00
	11·12	− 0·20		25·26	− 1·50
	13·14	+ 2·80		27·28	+ 0·80
	13·14	− 0·30		27·28	− 1·80

Vertical bracing—*continued*:

S. 29·30	+	0·60	S. 35·36	−	3·20
29·30	−	2·10	37·38	+	0·10
31·32	+	0·45	37·38	−	3·60
31·32	−	2·45	39·40	+	0·05
33·34	+	0·30	39·40	−	4·05
33·34	−	2·80	41·42	+	0·50
35·36	+	0·20	41·42	−	0·00

Inclined bracing:

S. 1·4	+	0·000	S. 19·24	−	1·762
1·4	−	5·600	21·26	+	2·121
1·6	+	0·000	21·26	−	1·414
1·6	−	6·345	23·28	+	2·538
3·8	+	0·070	23·28	−	1·128
3·8	−	5·710	25·30	+	2·961
5·10	+	0·141	25·30	−	0·846
5·10	−	5·076	27·32	+	3·454
7·12	+	0·282	27·32	−	0·634
7·12	−	4·512	29·34	+	3·948
9·14	+	0·423	29·34	−	0·423
9·14	−	3·948	31·36	+	4·512
11·16	+	0·634	31·36	−	0·282
11·16	−	3·454	33·38	+	5·076
13·18	+	0·846	33·38	−	0·141
13·18	−	2·961	35·40	+	5·710
15·20	+	1·128	35·40	−	0·070
15·20	−	2·538	37·42	+	6·345
17·22	+	1·414	37·42	−	0·000
17·22	−	2·121	39·42	+	5·600
19·24	+	1·762	39·42	−	0·000

Note.—The stresses in the bracing when inclined opposite ways from the centre can easily be deter-

mined from these constants, also the stresses in counterbraces if these are added in some of the panels. The parts 2·4 would practically be made of the same strength as 4·6, and 41·42 require particularly to be considered for axle loads.

TRUSS DIAGRAM No. 56.

PARABOLIC BOWSTRING.

CONDITIONS.

1. Depth at centre .. .. $\frac{1}{6}$ of the span.
2. Number of panels .. .. 8.
3. Method of loading .. .. On bottom flange.
4. Description of bracing .. Vertical and inclined two ways.

EVENLY DISTRIBUTED DEAD LOAD.

Stress Constants.

Top flange:

S. 2·3	+	6·94	S. 5·7	+	6·18
3·5	+	6·50	7·9	+	6·02

Bottom flange:

S. 2·4	−	6·00	S. 6·8	−	6·00
4·6	−	6·00	8·10	−	6·00

Vertical bracing:

S. 3·4	−	1·00	S. 7·8	−	1·00
5·6	−	1·00	9·10	−	1·00

Inclined bracing:

S. 3·6	..	..	..	0·00
5·8	..	..	..	0·00
7·10	..	..	..	0·00

EVENLY DISTRIBUTED LIVE LOAD ADVANCING FROM EITHER ABUTMENT.

Maximum Stress Constants.

Top flange:

S. 2·3	+	6·94	S. 5·7	+	6·18
3·5	+	6·50	7·9	+	6·02

Bottom flange:

S. 2·4	−	6·00	S. 6·8	−	6·00
4·6	−	6·00	8·10	−	6·00

Vertical bracing:

S. 3·4	+	0·000	S. 7·8	+	0·500
3·4	−	1·000	7·8	−	1·500
5·6	+	0·312	9·10	+	0·000
5·6	−	1·312	9·10	−	1·000

Inclined bracing:

S. 3·6	+	0·868	S. 5·8	−	1·060
3·6	−	0·868	7·10	+	1·200
5·8	+	1·060	7·10	−	1·200

TRUSS DIAGRAM No. 57.

PARABOLIC BOWSTRING.

CONDITIONS.

1. Depth at centre .. .. $\frac{1}{6}$ of the span.
2. Number of panels .. .. 8.
3. Method of loading .. .. On bottom flange.
4. Description of bracing .. Vertical and inclined one way.

EVENLY DISTRIBUTED DEAD LOAD.

Stress Constants.

Top flange:

S. 2·3	+	6·94	S. 5·7	+	6·18
3·5	+	6·50	7·9	+	6·02

Bottom flange:

S. 2·4	−	6·00	S. 6·8	−	6·00
4·6	−	6·00	8·10	−	6·00

Vertical bracing:

S. 3·4	−	1·00	S. 7·8	−	1·00
5·6	−	1·00	9·10	−	1·00

Inclined bracing:

S. 3·6	0·00	S. 9·8	0·00
5·8	0·00	7·6	0·00
7·10	0·00	5·4	0·00

TRUSS DIAGRAMS

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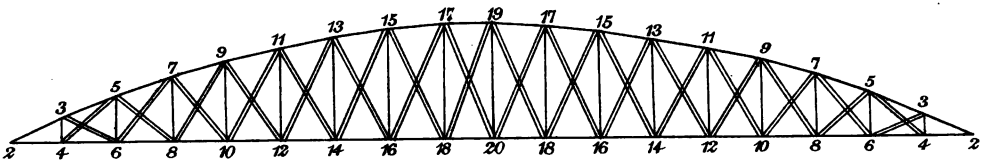

Load Line

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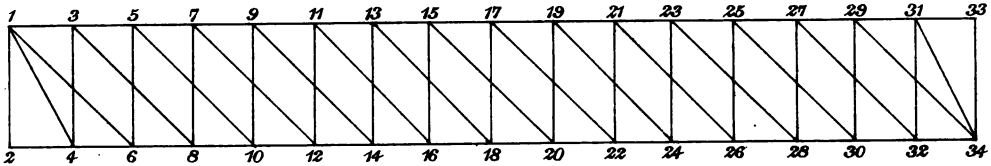

Load Line

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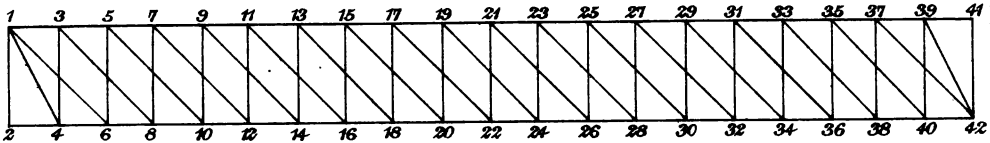

Load Line

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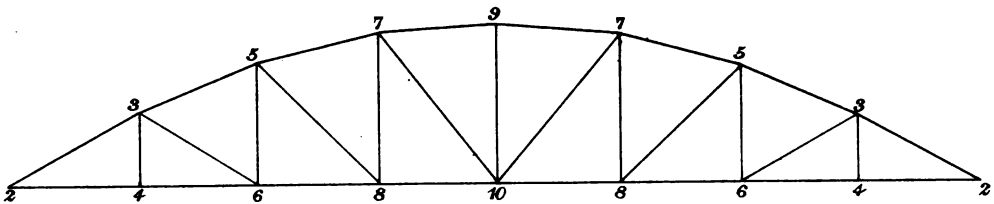

Load Line

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EVENLY DISTRIBUTED LIVE LOAD ADVANCING FROM EITHER ABUTMENT.

Maximum Stress Constants.

Top flange:

S. 2·3	+	6·94	S. 5·7	+	6·18
3·5	+	6·50	7·9	+	6·02

Bottom flange:

S. 2·4	−	6·00	S. 6·8	−	6·00
4·6	−	6·00	8·10	−	6·00

Vertical bracing:

S. 3·4	+	0·000	S. 7·8	+	0·500
3·4	−	1·000	7·8	−	1·500
5·6	+	0·312	9·10	+	0·562
5·6	−	1·312	9·10	−	1·562

Inclined bracing:

S. 3·6	+	0·868	S. 9·8	+	1·250
3·6	−	0·868	9·8	−	1·250
5·8	+	1·060	7·6	+	1·200
5·8	−	1·060	7·6	−	1·200
7·10	+	1·200	5·4	+	1·060
7·10	−	1·200	5·4	−	1·060

TRUSS DIAGRAM No. 58.

PARABOLIC BOWSTRING.

CONDITIONS.

1. Depth at centre .. .. $\frac{1}{6}$ of the span.
2. Number of panels .. .. 8.
3. Method of loading .. .. On bottom flange.
4. Description of bracing .. Vertical and inclined cross bracing.

EVENLY DISTRIBUTED DEAD LOAD.

Stress Constants.

Top flange:

S. 2·3	+	6·94	S. 5·7	+	6·18
3·5	+	6·50	7·9	+	6·02

Bottom flange:

S. 2·4	−	6·00	S. 6·8	−	6·00
4·6	−	6·00	8·10	−	6·00

Vertical bracing:

S. 3·4	−	1·00	S. 7·8	−	1·00
5·6	−	1·00	9·10	−	1·00

Inclined bracing:

S. 3·6	0·00	S. 4·5	0·00
5·8	0·00	6·7	0·00
7·10	0·00	8·9	0·00

EVENLY DISTRIBUTED LIVE LOAD ADVANCING FROM EITHER ABUTMENT.

Maximum Stress Constants.

Top flange:

S. 2·3	+	6·94	S. 5·7	+	6·18
3·5	+	6·50	7·9	+	6·02

Bottom flange:

S. 2·4	−	6·00	S. 6·8	−	6·00
4·6	−	6·00	8·10	−	6·00

Vertical bracing:

S. 3·4	+	0·000	S. 7·8	+	0·500
3·4	−	1·000	7·8	−	1·000
5·6	+	0·312	9·10	+	0·562
5·6	−	1·000	9·10	−	1·000

Inclined bracing all ties with live load:

S. 3·6	−	0·868	S. 4·5	−	1·060
5·8	−	1·060	6·7	−	1·200
7·10	−	1·200	8·9	−	1·250

STRESS DIAGRAM No. 59.

PARABOLIC BOWSTRING.

CONDITIONS.

1. Depth at centre .. .. $\frac{1}{6}$ of the span.
2. Number of panels .. .. 8.
3. Method of loading .. .. On bottom flange.
4. Description of bracing .. Vertical and inclined cross bracing.

EVENLY DISTRIBUTED DEAD LOAD.

Stress Constants.

Top flange:

S. 2·3	+	6·94	S. 5·7	+	6·18
3·5	+	6·50	7·9	+	6·02

Bottom flange:

S. 2·4	−	6·00	S. 6·8	−	6·00
4·6	−	6·00	8·10	−	6·00

Vertical bracing:

S. 3·4	−	1·00	S. 7·8	−	1·00
5·6	−	1·00	9·10	−	1·00

Inclined bracing:

S. 3·6	0·00	S. 4·5	0·00
5·8	0·00	6·7	0·00
7·10	0·00	8·9	0·00

EVENLY DISTRIBUTED LIVE LOAD ADVANCING FROM EITHER ABUTMENT.

Maximum Stress Constants.

Top flange:

S. 2·3	+	6·94	S. 5·7	+	6·18
3·5	+	6·50	7·9	+	6·02

Bottom flange:

S. 2·4	−	6·00	S. 6·8	−	6.00
4·6	−	6·00	8·10	−	6·00

Vertical bracing all ties with live load:

S. 3·4	−	1·000	S. 7·8	−	1·500
5·6	−	1·312	9·10	−	1·562

Inclined bracing all struts with live load:

S. 3·6	+	0·868	S. 4·5	+	1·060
5·8	+	1·060	6·7	+	1·200
7·10	+	1·200	8·9	+	1·250

TRUSS DIAGRAM No. 60.

PARABOLIC BRACED ARCH.

CONDITIONS.

1. Depth at centre .. .. $\frac{1}{8 \cdot 0}$ of the span. Rise $\frac{1}{8}$ of the span.
2. Number of panels .. .. 20.
3. Method of loading .. On top flange.
4. Description of bracing .. Vertical and inclined.

EVENLY DISTRIBUTED DEAD LOAD.

Stress Constants.

Top flange:

S. 1·3	0·00	S. 11·13	0·00
3·5	0·00	13·15	0·00
5·7	0·00	15·17	0·00
7·9	0·00	17·19	0·00
9·11	0·00	19·21	0·00

Bottom flange:

S. 2·4	+ 22·14	S. 12·14	+ 20·48
4·6	+ 21·74	14·16	+ 20·31
6·8	+ 21·36	16·18	+ 20·16
8·10	+ 21·01	18·20	+ 20·07
10·12	+ 20·74	20·22	+ 20·01

Vertical bracing:

S. 1·2	+ 0·25	S. 13·14	+ 0·50
3·4	+ 0·50	15·16	+ 0·50
5·6	+ 0·50	17·18	+ 0·50
7·8	+ 0·50	19·20	+ 0·50
9·10	+ 0·50	21·22	+ 0·25
11·12	+ 0·50		

Inclined bracing:

S. 1·4	0·00	S. 11·14	0·00
3·6	0·00	13·16	0·00
5·8	0·00	15·18	0·00
7·10	0·00	17·20	0·00
9·12	0·00	19·22	0·00

Note.—The dead load is supposed to be divided between the flanges.

EVENLY DISTRIBUTED LIVE LOAD ADVANCING FROM EITHER ABUTMENT.

Maximum Stress Constants.

Top flange:

S. 1·3	+	1·30	S. 11·13	+	10·89
1·3	−	1·30	11·13	−	10·89
3·5	+	2·79	13·15	+	12·67
3·5	−	2·79	13·15	−	12·67
5·7	+	4·51	15·17	+	12·57
5·7	−	4·51	15·17	−	12·57
7·9	+	6·47	17·19	+	9·00
7·9	−	6·47	17·19	−	9·00
9·11	+	8·57	19·21	+	0·00
9·11	−	8·57	19·21	−	0·00

Bottom flange:

S. 2·4	+	22·14	S. 12·14	+	24·25
2·4	−	0·00	12·14	−	3·77
4·6	+	21·93	14·16	+	25·31
4·6	−	0·19	14·16	−	5·00
6·8	+	22·00	16·18	+	26·09
6·8	−	0·64	16·18	−	5·93
8·10	+	22·44	18·20	+	25·22
8·10	−	1·43	18·20	−	5·15
10·12	+	23·22	20·22	+	20·01
10·12	−	2·48	20·22	−	0·00

Vertical bracing:

S. 1·2	+	1·98	S. 11·12	−	1·51
1·2	−	1·48	13·14	+	2·09
3·4	+	3·77	13·14	−	1·09
3·4	−	2·77	15·16	+	1·64
5·6	+	3·55	15·16	−	0·64
5·6	−	2·55	17·18	+	2·10
7·8	+	3·27	17·18	−	1·10
7·8	−	2·27	19·20	+	2·80
9·10	+	2·96	19·20	−	1·80
9·10	−	1·96	21·22	+	0·50
11·12	+	2·51	21·22	−	0·00

Inclined bracing:

S. 1·4	+	3·23	S. 11·14	+	2·77
1·4	−	3·23	11·14	−	2·77
3·6	+	3·15	13·16	+	2·68
3·6	−	3·15	13·16	−	2·68
5·8	+	3·07	15·18	+	2·45
5·8	−	3·07	15·18	−	2·45
7·10	+	3·02	17·20	+	5·35
7·10	−	3·02	17·20	−	5·35
9·12	+	2·97	19·22	+	9·32
9·12	−	2·97	19·22	−	9·32

Note.—The parts 21·22 require particularly to be considered for Axle Loads.

END OF PART I.

To face Page 138.

TRUSS DIAGRAMS

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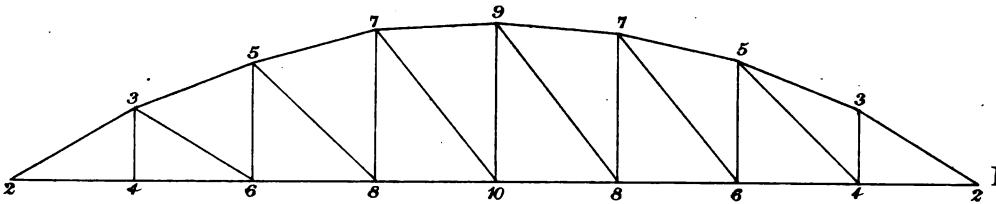

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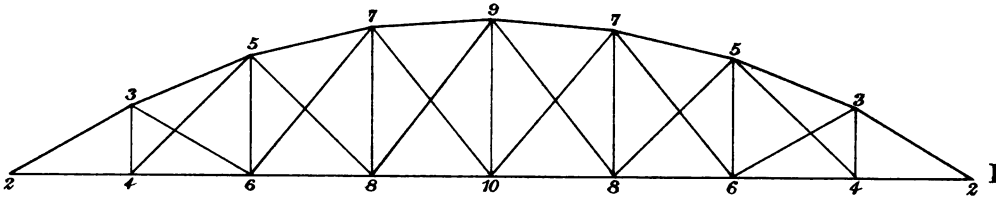

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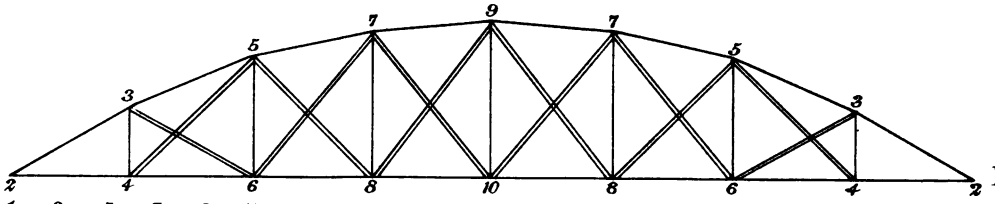

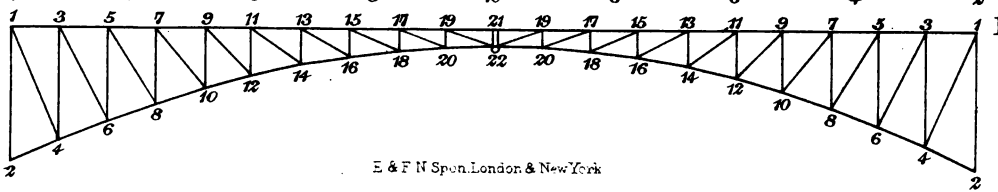

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PLATE 15

PART II.—ROOFS.

INTRODUCTORY.

1. Abbreviations, &c.

S = Stress in. + = Compression. − = Tension.

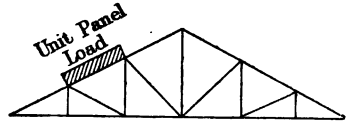


Fig. 2.

For Unit Panel Load see Fig. 2.

2. Stress Constants for Dead Load.

These are the stresses in each member of the roof truss when each panel is covered with a unit load. Taking Truss Diagram No. 72 as an example with a load of 1 ton, 1 kilogramme, or any other unit distributed over each of the eight panels on the principal rafters, the stress constants are the resulting stresses in terms of the load.

3. Maximum Stress Constants for Live Load.

These are the maximum stresses in each member of the roof truss which could be caused by a unit wind pressure per panel, acting normally to the principal rafters on one side only (either side indifferently), for Truss Diagrams Nos. 61 to 97, both inclusive, under the conditions of fixing shown in Figs. 3 and 4.

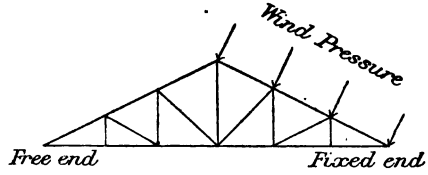


Fig. 3.

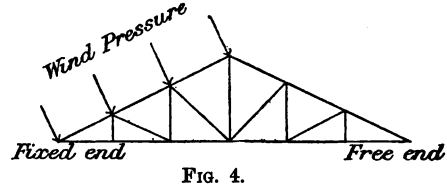


Fig. 4.

This arrangement gives the maximum stresses, and although, of course, there may be many cases where the method of fixing may be different, it is almost impossible to say how nearly they may approximate thereto by exigencies of construction, and it is best to be on the safe side.

For Truss Diagrams Nos. 98 to 100, both inclusive, the wind pressure has been supposed to act vertically on one side only (either side indifferently), as if a normal pressure had been taken it would have had, owing to the curved surface of the rafters, a different load value for each panel, which would have been very inconvenient.

Taking Truss Diagram No. 72 as an example with a load of 1 ton, 1 kilogramme, or any other unit per panel acting on all the panels on one side of the roof only (either side indifferently), the stress constants are the resulting maximum stresses in terms of the load.

It will be noticed that the only trusses subject to counter stresses in the bracing are Nos. 97 to 100.

4. Reference Numbers.

The numbers on the Truss Diagrams serve to indicate each member of a roof truss for which the stress constant is given.

Taking Truss Diagram No. 72 as an example under the head "Live Load" (Wind Pressure), maximum stress constants will be found S. 6·8, and opposite the stress constant — 4·46.

This means that the stress in the member 6·8 of Truss Diagram No. 72 due to a Live Load (Wind Pressure) of unit panel intensity is tension 4·46.

5. Position of Load.

The dead load is supposed to be concentrated wholly on the rafters. This is quite near enough in most cases for all practical purposes.

For very large and heavy roofs some allowance might be made to the tension members for the weight of the tie.

6. Normal Wind Pressure.

The following table gives the normal wind pressure per square foot for different slopes of roof equivalent to a horizontal wind pressure of 50 lbs. per square foot calculated by Hutton's formula:—

Pitch of Roof.											
° 10	° 15	° 20	° ′ 21 45 ⅛ span	° 25	° ′ 26 30 ¼ span	° 30	° ′ 33 30 ⅓ span	° 35	° 40	° 45 ½ span	° 50
12·1	18	22·6	25·2	28·8	30·2	33	36·6	37·8	41·6	43	47·6
Normal Wind Pressure in lbs. per square foot.											

7. Fully worked out Example.

As an example the stresses will be calculated in detail for a roof truss of the type shown in Truss Diagram No. 97 to cover a double line of railway, metre gauge, and two platforms, say 60 feet span, with trusses 8 feet apart, covered with 1-inch teak boarding and mangalore tiles, which makes a very light roof.

The dead load per panel will be length of panel, 6·48 feet × distance apart of trusses, 8 feet × weight of boarding, 3½ lbs., plus tiling, 8½ lbs., plus probable weight of truss, say 3 lbs.: total, 15 lbs. per square foot, which makes the panel load 778 lbs., say 0·35 of a ton.

The live load (wind pressure) will be area as above, say 52 square feet × 25 lbs. normal wind pressure: total, 1300 lbs., say 0·58 of a ton.

The stresses are as follows:—

Rafters:	*For Dead Load.*	Tons.
S. 1·3 =	stress constant + 10·72 × 0·35 ton panel load	+ 3·75
3·5	+ 17·20 × 0·35	+ 6·02
5·7	+ 17·30 × 0·35	+ 6·05
7·9	+ 14·37 × 0·35	+ 5·03
9·11	+ 10·78 × 0·35	+ 3·77

Tie:			Tons.
S. 1·4 = stress constant	− 10·00 × 0·35 ton	panel load	− 3·50
4·6	− 10·59 × 0·35		− 3·70
6·8	− 16·66 × 0·35		− 5·83
8·10	− 16·15 × 0·35		− 5·65
10·12	− 13·41 × 0·35		− 4·69
Bracing:			
S. 3·4 = stress constant	+ 4·00 × 0·35 ton	panel load	+ 1·40
5·6	+ 1·10 × 0·35		+ 0·38
7·8	− 1·54 × 0·35		− 0·54
9·10	− 3·33 × 0·35		− 1·16
11·12	− 7·00 × 0·35		− 2·45
3·6	− 6·07 × 0·35		− 2·12
5·8	− 0·16 × 0·35		− 0·05
7·10	+ 3·16 × 0·35		+ 1·10
9·12	+ 4·33 × 0·35		+ 1·51

For Live Load (Wind Pressure).

Rafters:			
S. 1·3 = stress constant	+ 6·66 × 0·58 ton	panel load	+ 3·86
3·5	+ 11·42 × 0·58		+ 6·62
5·7	+ 11·06 × 0·58		+ 6·41
7·9	+ 8·43 × 0·58		+ 4·89
9·11	+ 5·80 × 0·58		+ 3·36
Tie:			
S. 1·4 = stress constant	− 7·88 × 0·58 ton	panel load	− 4·57
4·6	− 8·33 × 0·58		− 4·83
6·8	− 12·28 × 0·58		− 7·12
8·10	− 11·33 × 0·58		− 6·57
10·12	− 8·40 × 0·58		− 4·87
Bracing:			
S. 3·4 = stress constant	+ 3·10 × 0·58 ton	panel load	+ 1·80
3·4	− 0·00 × 0·58		− 0·00
5·6	+ 0·54 × 0·58		+ 0·31
5·6	− 0·00 × 0·58		− 0·00
7·8	+ 0·00 × 0·58		+ 0·00
7·8	− 1·44 × 0·58		− 0·83

Bracing—*continued.*		Tons.
9·10	+ 0·00 × 0·58	+ 0·00
9·10	− 2·70 × 0·58	− 1·56
11·12	+ 0·00 × 0·58	+ 0·00
11·12	− 3·77 × 0·58	− 2·18
3·6	+ 0·00 × 0·58	+ 0·00
3·6	− 4·06 × 0·58	− 2·35
5·8	+ 0·74 × 0·58	+ 0·43
5·8	− 0·88 × 0·58	− 0·51
7·10	+ 3·13 × 0·58	+ 1·81
7·10	− 0·00 × 0·58	− 0·00
9·12	+ 3·97 × 0·58	+ 2·30
9·12	− 0·00 × 0·58	− 0·00

Maximum Stresses for Combined Dead and Live Loads.

	Tons.		Tons.	Total tons.
Rafters:				
S. 1·3 =	+ 3·75	and	+ 3·86	+ 7·61
3·5	+ 6·02		+ 6·62	+ 12·64
5·7	+ 6·05		+ 6·41	+ 12·46
7·9	+ 5·03		+ 4·89	+ 9·92
9·11	+ 3·77		+ 3·36	+ 7·13
Tie:				
S. 1·4 =	− 3·50	and	− 4·57	− 8·07
4·6	− 3·70		− 4·83	− 8·53
6·8	− 5·83		− 7·12	− 12·95
8·10	− 5·65		− 6·57	− 12·22
10·12	− 4·69		− 4·87	− 9·56
Bracing:				
S. 3·4 =	+ 1·40	and	+ 1·80	+ 3·20
3·4	+ 1·40		− 0·00	− 0·00
5·6	+ 0·38		+ 0·31	+ 0·69
5·6	+ 0·38		− 0·00	− 0·00
7·8	− 0·54		+ 0·00	+ 0·00
7·8	− 0·54		− 0·83	− 1·37
9·10	− 1·16		+ 0·00	+ 0·00

Bracing—*continued*:

	Tons.		Tons.	Total tons.
S. 9·10 =	− 1·16	and	− 1·56	− 2·72
11·12	− 2·45		+ 0·00	+ 0·00
11·12	− 2·45		− 2·18	− 4·63
3·6	− 2·12		+ 0·00	+ 0·00
3·6	− 2·12		− 2·35	− 4·47
5·8	− 0·05		+ 0·43	+ 0·38
5·8	− 0·05		− 0·51	− 0·56
7·10	+ 1·10		+ 1·81	+ 2·91
7·10	+ 1·10		− 0·00	− 0·00
9·12	+ 1·51		+ 2·30	+ 3·81
9·12	+ 1·51		− 0·00	− 0·00

It will be noticed that the only member of the Bracing which suffers counter stress is 5·8.

STRESS CONSTANTS FOR DEAD AND LIVE LOADS OF UNIT PANEL INTENSITY.

TRUSS DIAGRAM No. 61.

CONDITIONS.

1. Rise of truss	¼ of the span.
2. Rise of tie rod	Nil.
3. Number of panels	4.
4. Description of truss	Braced triangle.

EVENLY DISTRIBUTED DEAD LOAD.

Stress Constants.

Rafters:		
S. 2·3	+	2·12
3·5	+	1·41
Tie:		
S. 2·4	−	1·50
Bracing:		
S. 3·4	+	0·71
4·5	−	1·00

Live Load (Wind Pressure).

Maximum Stress Constants.

Rafters:		
S. 2·3	+	1·00
3·5	+	1·00
Tie:		
S. 2·4	−	1·41
Bracing:		
S. 3·4	+	1·00
4·5	−	0·71

TRUSS DIAGRAM No. 62.

Conditions.

1. Rise of truss	⅓ of the span.
2. Rise of tie rod	⅓ ditto.
3. Number of panels	4.
4. Description of truss	Braced trapezium.

Evenly distributed Dead Load.

Stress Constants.

Rafters:		
S. 2·3	+	4·23
3·5	+	2·82
Tie:		
S. 2·4	−	3·40

Bracing:

S. 3·4	..	..	..	+	1·00
4·5	..	..	..	−	3·00

Live Load (Wind Pressure).

Maximum Stress Constants.

Rafters:

S. 2·3	..	..	..	+	2·50
3·5	..	..	..	+	2·00

Tie:

S. 2·4	..	..	..	−	3·18

Bracing:

S. 3·4	..	..	..	+	1·41
4·5	..	..	..	−	2·13

TRUSS DIAGRAM No. 63.

CONDITIONS.

1. Rise of truss	⅛ of the span.
2. Rise of tie rod	Nil.
3. Number of panels	4.
4. Description of truss	Braced triangle.

EVENLY DISTRIBUTED DEAD LOAD.

Stress Constants.

Rafters:			
S. 2·3	.. .. ..	+	2·73
3·5	.. .. ..	+	1·82
Tie:			
S. 2·4	.. .. ..	−	2·25
Bracing:			
S. 3·4	.. .. ..	+	0·91
4·5	.. .. ..	−	1·00

LIVE LOAD (WIND PRESSURE).

Maximum Stress Constants.

Rafters:			
S. 2·3	.. .. ..	+	1·17
3·5	.. .. ..	+	1·08
Tie:			
S. 2·4	.. .. ..	−	1·82
Bracing:			
S. 3·4	.. .. ..	+	1·08
4·5	.. .. ..	−	0·60

TRUSS DIAGRAM No. 64.

CONDITIONS.

1. Rise of truss	½ of the span.
2. Rise of tie rod	Nil.
3. Number of panels	4.
4. Description of truss	Braced triangle.

EVENLY DISTRIBUTED DEAD LOAD.

Stress Constants.

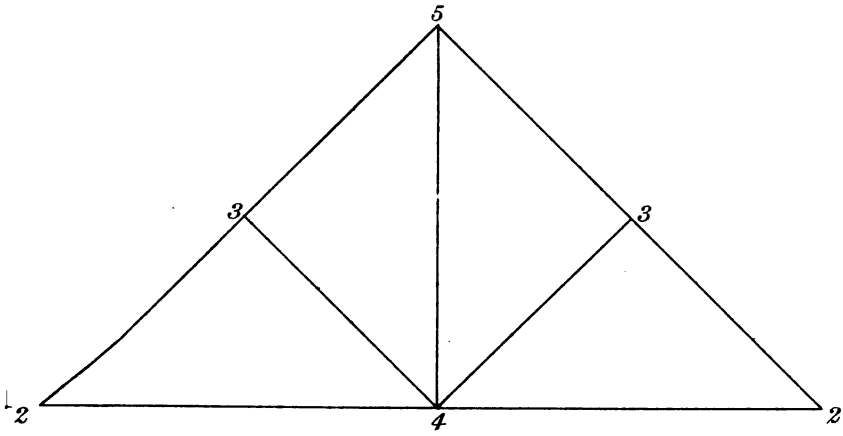
Rafters:			
S. 2·3	.. .. ..	+	3·36
3·5	.. .. ..	+	2·24
Tie:			
S. 2·4	.. .. ..	−	3·00
Bracing:			
S. 3·4	.. .. ..	+	1·12
4·5	.. .. ..	−	1·00

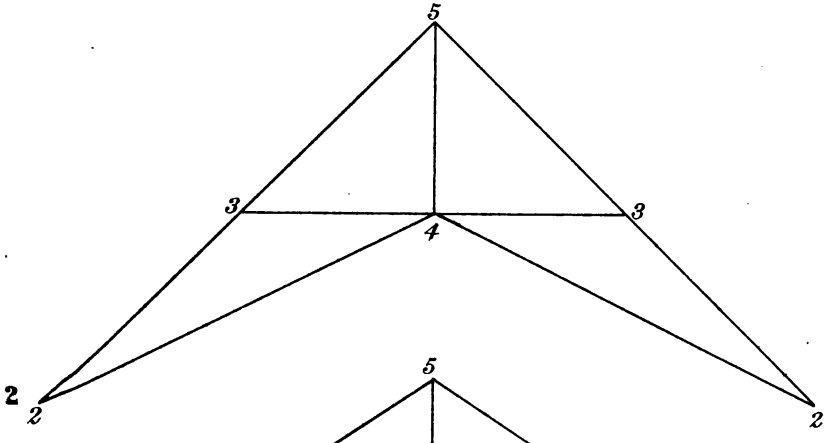
LIVE LOAD (WIND PRESSURE).

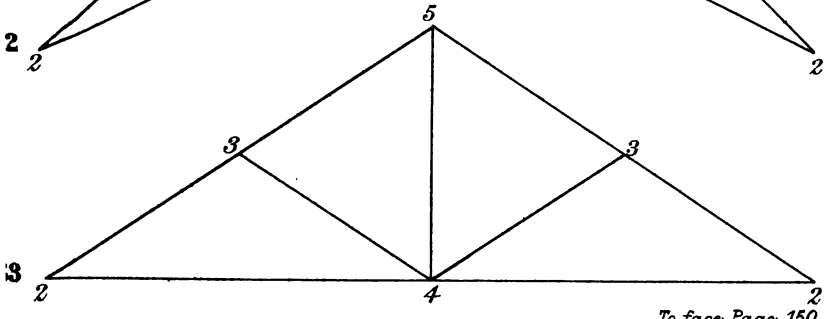
Maximum Stress Constants.

Rafters:			
S. 2·3	.. .. ..	+	1·74
3·5	.. .. ..	+	1·24
Tie:			
S. 2·4	.. .. ..	−	2·22
Bracing:			
S. 3·4	.. .. ..	+	1·24
4·5	.. .. ..	−	0·56

TRUSS DIAGRAMS







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TRUSS DIAGRAM No. 65.

CONDITIONS.

1. Rise of truss	$\frac{1}{4}$ of the span.
2. Rise of tie rod	$\frac{1}{20}$ of the span.
3. Number of panels	4.
4. Description of truss	Braced trapezium.

EVENLY DISTRIBUTED DEAD LOAD.

Stress Constants.

Rafters:		
S. 2·3	+	4·23
3·5	+	2·82
Tie:		
S. 2·4	−	3·80
Bracing:		
S. 3·4	+	1·30
4·5	−	1·50

LIVE LOAD (WIND PRESSURE).

Maximum Stress Constants.

Rafters:		
S. 2·3	+	2·38
3·5	+	1·56
Tie:		
S. 2·4	−	2·85
Bracing:		
S. 3·4	+	1·46
4·5	−	0·84

TRUSS DIAGRAM No. 66.

CONDITIONS.

1. Rise of truss	⅛ of the span.
2. Rise of tie rod	Nil.
3. Number of panels	4.
4. Description of truss	Braced triangle.

EVENLY DISTRIBUTED DEAD LOAD.

Stress Constants.

Rafters:

S. 2·3	+	3·35
3·5	+	2·90

Tie:

S. 2·4	−	3·00
4·6	−	2·00

Bracing:

S. 3·4	+	0·90
4·5	−	1·00
5·6 * (only supports part of tie rod).		

LIVE LOAD (WIND PRESSURE).

Maximum Stress Constants.

Rafters:

S. 2·3	+	1·75
3·5	+	1·75

* Not necessary to stability of truss.

Tie:

S. 2·4	.. .. ..	−	2·22
4·6	.. .. ..	−	1·11

Bracing:

S. 3·4	.. .. ..	+	1·00
4·5	.. .. ..	−	1·11
5·6 *	.. .. ..		0·00

TRUSS DIAGRAM No. 67.

Conditions.

1. Rise of truss	$\frac{1}{4}$ of the span.
2. Rise of tie rod	$\frac{1}{20}$ of the span.
3. Number of panels	4.
4. Description of truss	Braced polygon.

Evenly distributed Dead Load.

Stress Constants.

Rafters:

S. 2·3	.. .. ..	+	5·05
3·5	.. .. ..	+	4·60

Tie:

S. 2·4	.. .. ..	−	4·60
4·6	.. .. ..	−	2·50

* Not necessary to stability of truss.

Bracing:

S. 3·4	..	..	..	+	0·90
4·5	..	..	..	−	2·25
5·6 *	(only supports part of tie rod).				

Live Load (Wind Pressure).

Maximum Stress Constants.

Rafters:

S. 2·3	..	..	..	+	3·11
3·5	..	..	..	+	3·11

Tie:

S. 2·4	..	..	..	−	3·50
4·6	..	..	..	−	1·40

Bracing:

S. 3·4	..	..	..	+	1·00
4·5	..	..	..	−	2·20
5·6 *	..	..	..		0·00

* Not necessary to stability of truss.

TRUSS DIAGRAMS

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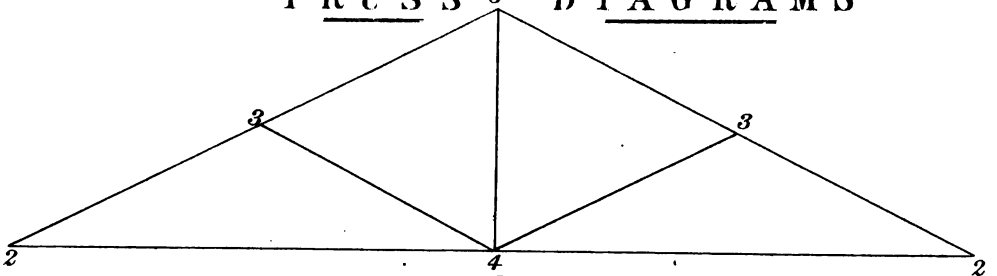

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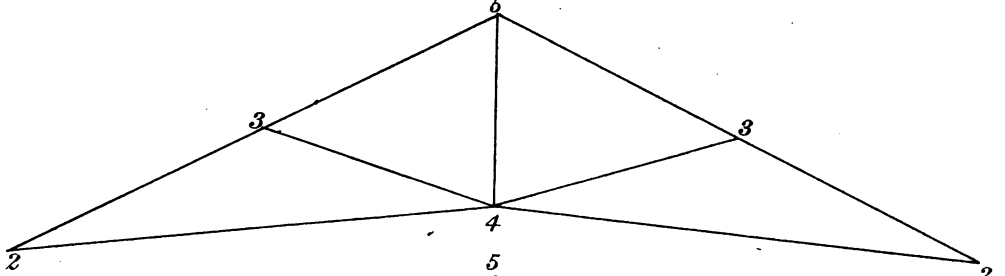

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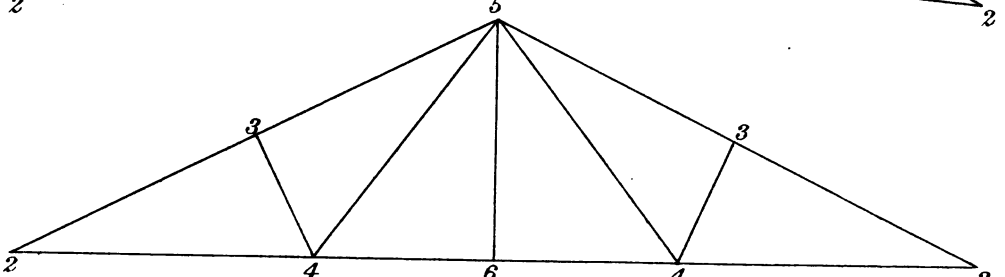

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TRUSS DIAGRAM No. 68.

CONDITIONS.

1. Rise of truss	⅛ of the span.
2. Rise of tie rod	Nil.
3. Number of panels	6.
4. Description of truss	Braced triangle.

EVENLY DISTRIBUTED DEAD LOAD.

Stress Constants.

Rafters:			
S. 2·3	.. .. ..	+	5·60
3·5	.. .. ..	+	4·57
5·7	.. .. ..	+	4·70
Tie:			
S. 2·4	.. .. ..	−	5·00
4·6	.. .. ..	−	3·00
Bracing:			
S. 3·4	.. .. ..	+	1·07
4·5	.. .. ..	+	1·07
4·7	.. .. ..	−	2·00
6·7* (only supports part of tie rod).			

LIVE LOAD (WIND PRESSURE).

Maximum Stress Constants.

Rafters:			
S. 2·3	.. .. ..	+	3·14
3·5	.. .. ..	+	2·46
5·7	.. .. ..	+	3·14

* Not necessary to stability of truss.

Tie:

S. 2·4	.. .. ..	− 3·91
4·6	.. .. ..	− 1·68

Bracing:

S. 3·4	+	1·20	S. 4·7	−	2·25
4·5	+	1·20	6·7 *		0·00

TRUSS DIAGRAM No. 69.

Conditions.

1. Rise of truss	$\frac{1}{4}$ of the span.
2. Rise of tie rod	$\frac{1}{30}$ of the span.
3. Number of panels	6.
4. Description of truss	Braced polygon.

Evenly distributed Dead Load.

Stress Constants.

Rafters:

S. 2·3	.. .. ..	+ 7·25
3·5	.. .. ..	+ 6·00
5·7	.. .. ..	+ 6·40

Tie:

S. 2·4	.. . ..	− 6·55
4·6	.. .. ..	− 3·50

* Not necessary to stability of truss.

Bracing:

S. 3·4	..	..	..	+	1·22
4·5	..	..	..	+	1·22
4·7	..	..	..	−	3·25
6·7* (only supports part of tie rod).					

LIVE LOAD (WIND PRESSURE).

Maximum Stress Constants.

Rafters:

S. 2·3	..	..	..	+	4·47
3·5	..	..	..	+	3·54
5·7	..	..	..	+	4·47

Tie:

S. 2·4	..	..	..	−	5·15
4·6	..	..	..	−	1·93

Bracing:

S. 3·4	+	1·36	S. 4·7	−	3·30
4·5	+	1·36	6·7*		0·00

* Not necessary to stability of truss.

TRUSS DIAGRAM No. 70.

CONDITIONS.

1. Rise of truss	⅛ of the span.
2. Rise of tie rod	Nil.
3. Number of panels	6.
4. Description of truss	Braced triangle.

EVENLY DISTRIBUTED DEAD LOAD.

Stress Constants.

Rafters :

S. 2·3	+	5·60
3·5	+	4·48
5·7	+	3·36

Tie :

S. 2·4	−	5·00
4·6	−	5·00
6·8	−	4·00

Bracing :

S. 3·4 * (only supports part of tie rod).		
5·6	−	0·50
7·8	−	2·00
3·6	+	1·12
5·8	+	1·40

* Not necessary to stability of truss.

TRUSS DIAGRAMS

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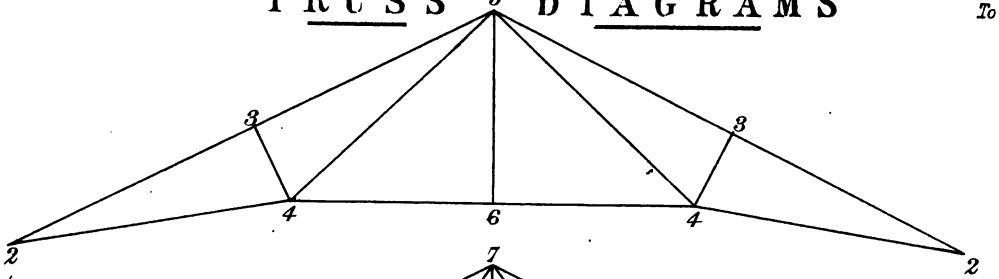

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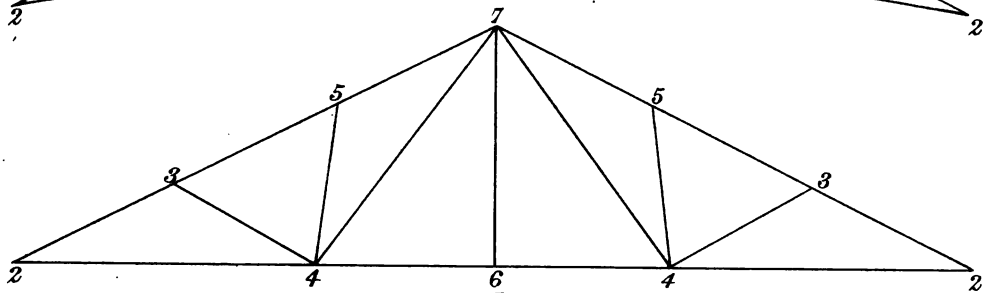

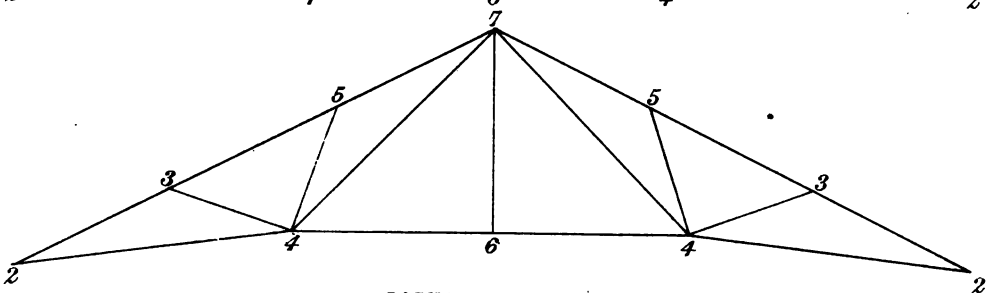

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PLATE 18.

Live Load (Wind Pressure).

Maximum Stress Constants.

Rafters:

S. 2·3	+	3·14
3·5	+	2·38
5·7	+	1·86

Tie:

S. 2·4	−	3·93
4·6	−	3·93
6·8	−	2·79

Bracing:

S. 3·4 *		0·00	S. 3·6	+	1·26
5·6	−	0·56	5·8	+	1·57
7·8	−	1·12			

* Not necessary to stability of truss.

TRUSS DIAGRAM No. 71.

CONDITIONS.

1. Rise of truss	$\frac{1}{4}$ of the span.
2. Rise of tie rod	$\frac{1}{30}$ of the span.
3. Number of panels	6.
4. Description of truss	Braced trapezium.

EVENLY DISTRIBUTED DEAD LOAD.

Stress Constants.

Rafters:

S. 2·3	..	..	+ 6·50
3·5	..	..	+ 5·20
5·7	..	..	+ 3·90

Tie:

S. 2·4	..	..	− 5·82
4·6	..	..	− 5·82
6·8	..	..	− 4·66

Bracing:

S. 3·4* (only supports part of tie rod).			
5·6	..	..	− 0·50
7·8	..	..	− 2·47
3·6	..	..	+ 1·23
5·8	..	..	+ 1·49

* Not necessary to stability of truss.

LIVE LOAD (WIND PRESSURE).

Maximum Stress Constants.

Rafters:

S. 2·3	+	3·84
3·5	+	2·88
5·7	+	2·17

Tie:

S. 2·4	−	4·55
4·6	−	4·55
6·8	−	3·25

Bracing:

S. 3·4*		0·00	S. 3·6	+	1·40
5·6	−	0·56	5·8	+	1·65
7·8	−	1·38			

* Not necessary to stability of truss.

TRUSS DIAGRAM No. 72.

CONDITIONS.

1. Rise of truss	⅛ of the span.
2. Rise of tie rod	Nil.
3. Number of panels	8.
4. Description of truss	Braced triangle.

EVENLY DISTRIBUTED DEAD LOAD.

Stress Constants.

Rafters:

S. 2·3	+	7·84	S. 5·7	+	5·60
3·5	+	6·72	7·9	+	4·48

Tie:

S. 2·4	−	7·00	S. 6·8	−	6·00
4·6	−	7·00	8·10	−	5·00

Bracing:

S. 3·4* (only supports part of tie rod).		
5·6	−	0·50
7·8	−	1·00
9·10	−	3·00
3·6	+	1·12
5·8	+	1·43
7·10	+	1·80

* Not necessary to stability of truss.

Live Load (Wind Pressure).

Maximum Stress Constants.

Rafters:

S. 2·3	+	4·50	S. 5·7	+	2·98
3·5	+	3·74	7·9	+	2·48

Tie:

S. 2·4	−	5·58	S. 6·8	−	4·46
4·6	−	5·58	8·10	−	3·34

Bracing:

S. 3·4*		0·00	S. 3·6	+	1·25
5·6	−	0·56	5·8	+	1·57
7·8	−	1·12	7·10	+	2·01
9·10	−	1·65			

* Not necessary to stability of truss.

TRUSS DIAGRAM No. 73.

CONDITIONS.

1.	Rise of truss	$\frac{1}{4}$ of the span.
2.	Rise of tie rod	$\frac{1}{10}$ of the span.
3.	Number of panels	8.
4.	Description of truss	Braced trapezium.

EVENLY DISTRIBUTED DEAD LOAD.

Stress Constants.

Rafters:

S. 2·3	+	9·00	S. 5·7	+	6·40
3·5	+	7·70	7·9	+	5·10

Tie:

S. 2·4	−	8.05	S. 6·8	−	6·90
4·6	−	8·05	8·10	−	5·75

Bracing:

S. 3·4 * (only supports part of tie rod).					
5·6	..	..	..	−	0·50
7·8	..	..	..	−	1·00
9·10	..	..	..	−	3·60
3·6	..	..	..	+	1·23
5·8	..	..	..	+	1·48
7·10	..	..	..	+	1·84

* Not necessary to stability of truss.

TRUSS DIAGRAMS

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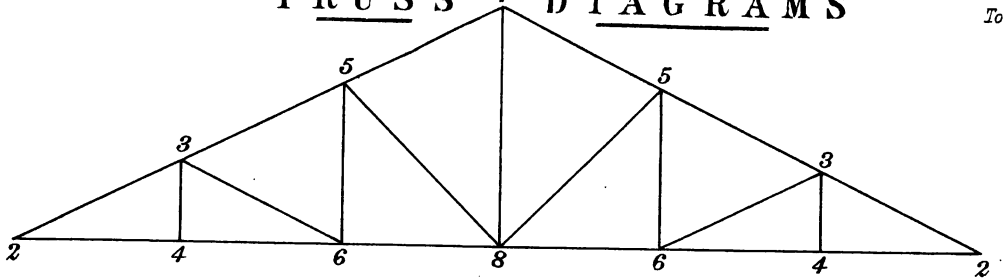

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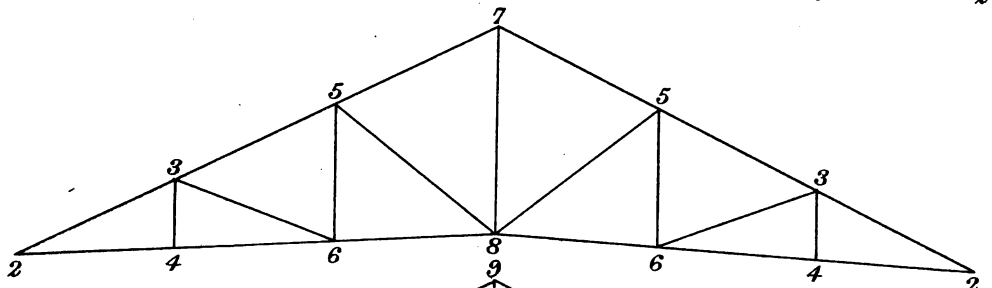

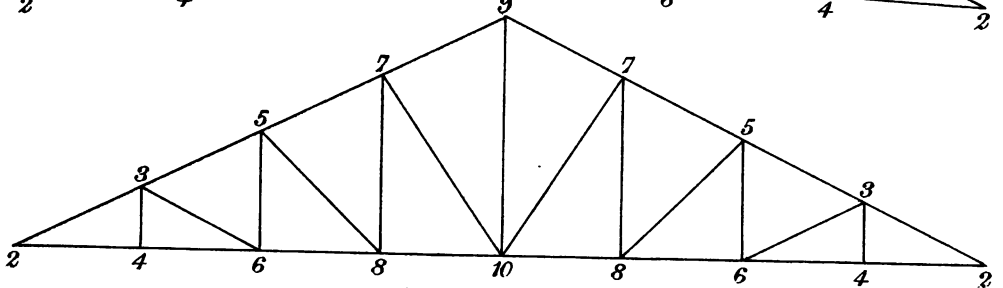

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PLATE 19.

Live Load (Wind Pressure).

Maximum Stress Constants.

Rafters:

S. 2·3	+	5·45	S. 5·7	+	3·55
3·5	+	4·50	7·9	+	2·88

Tie:

S. 2·4	−	6·45	S. 6·8	−	5·15
4·6	−	6·45	8·10	−	3·85

Bracing:

S. 3·4*	−	0·00	S. 3·6	+	1·39
5·6	−	0·56	5·8	+	1·65
7·8	−	1·12	7·10	+	2·05
9·10	−	2·02			

* Not necessary to stability of truss.

TRUSS DIAGRAM No. 74.

CONDITIONS.

1. Rise of truss	¼ of the span.
2. Rise of tie rod	Nil.
3. Number of panels	8.
4. Description of truss	Braced triangle.

EVENLY DISTRIBUTED DEAD LOAD.

Stress Constants.

Rafters:

S. 2·3	+	7·80	S. 5·7	+	6·90
3·5	+	7·35	7·9	+	6·45

Tie:

S. 2·4	..	..	..	−	7·00
4·6	..	..	..	−	6·00
6·10	..	..	..	−	4·00

Bracing:

S. 3·4	..	..	..	+	0·89
5·6	..	..	..	+	1·78
7·8	..	..	..	+	0·89
4·5	..	..	..	−	1·00
5·8	..	..	..	−	1·00
6·8	..	..	..	−	2·00
8·9	..	..	..	−	3·00

9·10 * (only supports part of tie rod).

* Not necessary to stability of truss.

Live Load (Wind Pressure).

Maximum Stress Constants.

Rafters:

S. 2·3	+	4·55		S. 5·7	+	4·55
3·5	+	4·55		7·9	+	4·55

Tie:

S. 2·4	..	..	..		−	5·64
4·6	..	..	..		−	4·51
6·10	..	..	..		−	2·25

Bracing:

S. 3·4	+	1·00		S. 5·8	−	1·12
5·6	+	2·00		6·8	−	2·25
7·8	+	1·00		8·9	−	3·38
4·5	−	1·12		9·10 *		0·00

* Not necessary to stability of truss.

TRUSS DIAGRAM No. 75.

CONDITIONS.

1. Rise of truss	$\frac{1}{4}$ of the span.
2. Rise of tie rod	$\frac{1}{30}$ of the span.
3. Number of panels	8.
4. Description of truss	Braced polygon.

EVENLY DISTRIBUTED DEAD LOAD.

Stress Constants.

Rafters:

S. 2·3	+	10·17	S. 5·7	+	9·27
3·5	+	9·72	7·9	+	8·82

Tie:

S. 2·4	.. .. ..	−	9·15
4·6	.. .. ..	−	7·83
6·10	.. .. ..	−	4·65

Bracing:

S. 3·4	.. .. ..	+	0·89
5·6	.. .. ..	+	1·78
7·8	.. .. ..	+	0·89
4·5	.. .. ..	−	1·32
5·8	.. .. ..	−	1·32
6·8	.. .. ..	−	3·42
8·9	.. .. ..	−	4·74
9·10* (only supports part of tie rod).			

* Not necessary to stability of truss.

Live Load (Wind Pressure).

Maximum Stress Constants.

Rafters:

S. 2·3	+	6·36		S. 5·7	+	6·36
3·5	+	6·36		7·9	+	6·36

Tie:

S. 2·4	..	..	..		−	7·30
4·6	..	..	..		−	5·85
6·10	..	..	..		−	2·62

Bracing:

S. 3·4	+	1·00		S. 5·8	−	1·45
5·6	+	2·00		6·8	−	3·35
7·8	+	1·00		8·9	−	4·80
4·5	−	1·45		9·10*		0·00

* Not necessary to stability of truss.

TRUSS DIAGRAM No. 76.

CONDITIONS.

1. Rise of truss	¼ of the span.
2. Rise of tie rod	Nil.
3. Number of panels	12.
4. Description of truss	Braced triangle.

EVENLY DISTRIBUTED DEAD LOAD.

Stress Constants.

Rafters:

S. 2·3	+	12·30	S. 7·9	+	8·94
3·5	+	11·18	9·11	+	7·82
5·7	+	10·06	11·13	+	6·70

Tie:

S. 2·4	−	11·00	S. 8·10	−	9·00
4·6	−	11·00	10·12	−	8·00
6·8	−	10·00	12·14	−	7·00

Bracing:

S. 3·4 * (only supports part of tie rod).				
5·6	..	..	−	0·50
7·8	..	..	−	1·00
9·10	..	..	−	1·50
11·12	..	..	−	2·00
13·14	..	..	−	5·00
3·6	..	..	+	1·12

* Not necessary to stability of truss.

TRUSS DIAGRAMS

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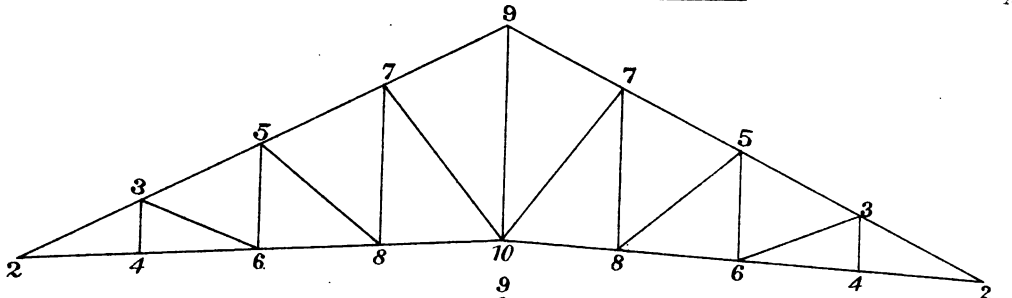

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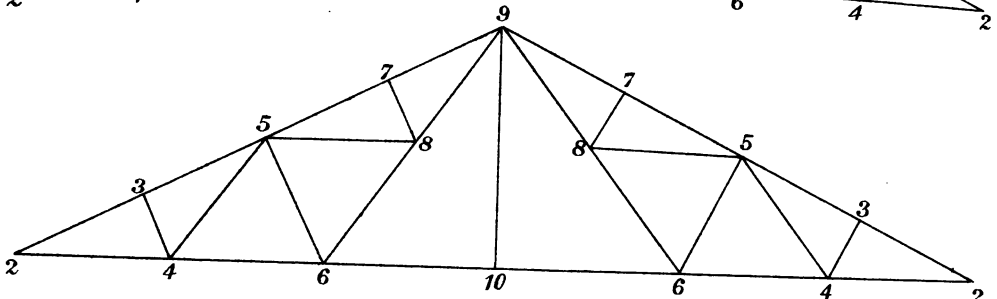

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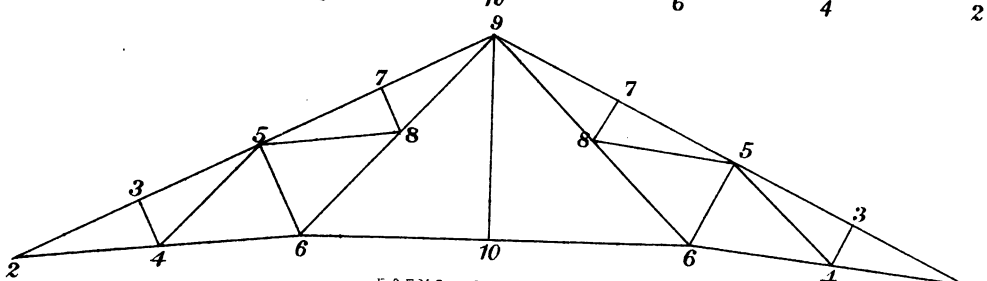

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Bracing—*continued.*

S. 5·8	..	..	..	+	1·41
7·10	..	..	..	+	1·80
9·12	..	..	..	+	2·22
11·14	..	..	..	+	2·68

Live Load (Wind Pressure).

Maximum Stress Constants.

Rafters:

S. 2·3	+	7·26	S. 7·9	+	4·98
3·5	+	6·50	9·11	+	4·22
5·7	+	5·74	11·13	+	3·72

Tie:

S. 2·4	−	8·92	S. 8·10	−	6·68
4·6	−	8·92	10·12	−	5·56
6·8	−	7·80	12·14	−	4·44

Bracing:

S. 3·4*		0·00	S. 3·6	+	1·24
5·6	−	0·56	5·8	+	1·58
7·8	−	1·12	7·10	+	2·02
9·10	−	1·68	9·12	+	2·50
11·12	−	2·23	11·14	+	3·00
13·14	−	2·78			

* Not necessary to stability of truss.

TRUSS DIAGRAM No. 77.

CONDITIONS.

1.	Rise of truss	$\frac{1}{4}$ of the span.
2.	Rise of tie rod	$\frac{1}{10}$ of the span.
3.	Number of panels	12.
4.	Description of truss	Braced trapezium.

EVENLY DISTRIBUTED DEAD LOAD.

Stress Constants.

Rafters:

S. 2·3	+	13·73	S. 7·9	+	9·98
3·5	+	12·48	9·11	+	8·73
5·7	+	11·23	11·13	+	7·48

Tie:

S. 2·4	−	12·30	S. 8·10	−	10·06
4·6	−	12·30	10·12	−	8·94
6·8	−	11·18	12·14	−	7·82

Bracing·

S. 3·4 * (only supports part of tie rod).		
5·6	−	0·50
7·8	−	1·00
9·10	−	1·50
11·12	−	2·00
13·14	−	5·00
3·6	+	1·18

* Not necessary to stability of truss.

Bracing—*continued.*

S. 5·8	..	..	..	+	1·45
7·10	..	..	..	+	1·85
9·12	..	..	..	+	2·24
11·14	..	..	..	+	2·69

Live Load (Wind Pressure).

Maximum Stress Constants.

Rafters:

S. 2·3	+	8·38	S. 7·9	+	5·68
3·5	+	7·48	9·11	+	4·78
5·7	+	6·58	11·13	+	4·15

Tie:

S. 2·4	−	9·98	S. 8·10	−	7·46
4·6	−	9·98	10·12	−	6·20
6·8	−	8·72	12·14	−	4·94

Bracing:

S. 3·4*		0·00	S. 3·6	+	1·35
5·6	−	0·56	5·8	+	1·63
7·8	−	1·12	7·10	+	2·04
9·10	−	1·68	9·12	+	2·50
11·12	−	2·23	11·14	+	3·00
13·14	−	3·16			

* Not necessary to stability of truss.

TRUSS DIAGRAM No. 78.

CONDITIONS.

1. Rise of truss	$\frac{1}{5}$ of the span.
2. Rise of tie rod	Nil.
3. Number of panels	4.
4. Description of truss	Braced triangle.

EVENLY DISTRIBUTED DEAD LOAD.

Stress Constants.

Rafters:

S. 2·3	+	4·03
3·5	+	2·69

Tie:

S. 2·4	−	3·75

Bracing:

S. 3·4	+	1·34
5·4	−	1·00

LIVE LOAD (WIND PRESSURE).

Maximum Stress Constants.

Rafters:

S. 2·3	+	2.31
3·5	+	1·46

Live Load (Wind Pressure).

Maximum Stress Constants.

Rafters:

S. 2·3	+	6·36	S. 5·7	+	6·36
3·5	+	6·36	7·9	+	6·36

Tie:

S. 2·4	..	..	..	−	7·30
4·6	..	..	..	−	5·85
6·10	..	..	..	−	2·62

Bracing:

S. 3·4	+	1·00	S. 5·8	−	1·45
5·6	+	2·00	6·8	−	3·35
7·8	+	1·00	8·9	−	4·80
4·5	−	1·45	9·10 *		0·00

* Not necessary to stability of truss.

Live Load (Wind Pressure).

Maximum Stress Constants.

Rafters:		
S. 2·3	+	3·25
3·5	+	1·90
Tie:		
S. 2·4	−	3·58
Bracing:		
S. 3·4	+	1·84
4·5	−	0·90

TRUSS DIAGRAM No. 80.

Conditions.

1. Rise of truss	$\frac{1}{5}$ of the span.
2. Rise of tie rod	Nil.
3. Number of panels	4.
4. Description of truss	Braced triangle.

Evenly distributed Dead Load.

Stress Constants.

Rafters:		
S. 2·3	+	4·03
3·5	+	3·66

TRUSS DIAGRAMS

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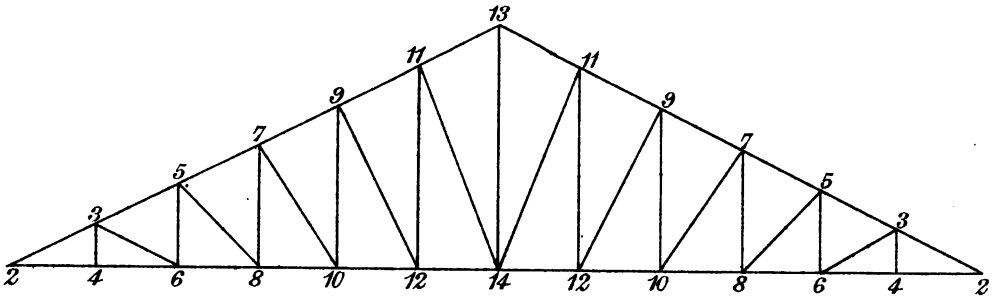

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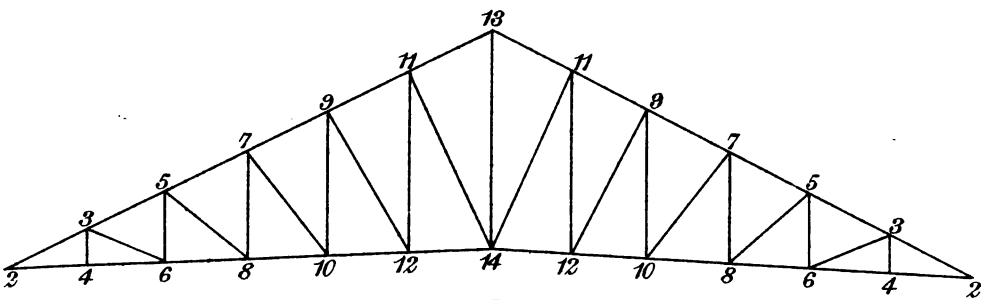

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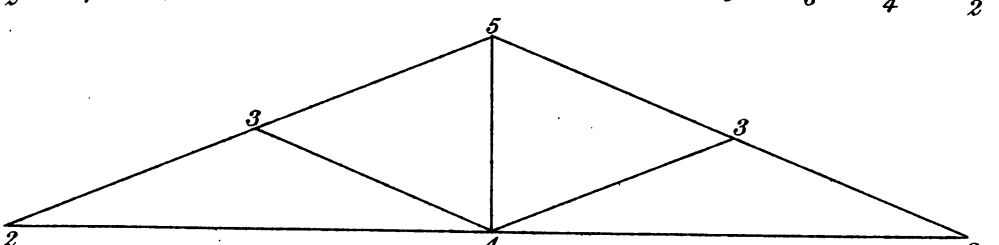

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Tie:

S. 2·4	..	..	− 3·75
4·6	..	..	− 2·50

Bracing:

S. 3·4	..	..	+ 0·93
5·4	..	..	− 1·25
5·6 * (only supports part of tie rod).			

Live Load (Wind Pressure).

Maximum Stress Constants.

Rafters:

S. 2·3	..	..	+ 2·30
3·5	..	..	+ 2·30

Tie:

S. 2·4	..	..	− 2·70
4·6	..	..	− 1·35

Bracing:

S. 3·4	..	..	+ 1·00
4·5	..	..	− 1·35
5·6*	..	..	0·00

* Not necessary to stability of truss.

TRUSS DIAGRAM No. 81.

CONDITIONS.

1. Rise of truss	$\frac{1}{5}$ of the span.
2. Rise of tie rod	$\frac{1}{30}$ of the span.
3. Number of panels	4.
4. Description of truss	Braced polygon.

EVENLY DISTRIBUTED DEAD LOAD.

Stress Constants.

Rafters:		
S. 2·3	+	5·70
3·5	+	5·33
Tie:		
S. 2·4	−	5·33
4·6	−	2·98
Bracing:		
S. 3·4	+	0·93
5·4	−	2·47
5·6 * (only supports part of tie rod).		

LIVE LOAD (WIND PRESSURE).

Maximum Stress Constants.

Rafters:		
S. 2·3	+	3·70
3·5	+	3·70

* Not necessary to stability of truss.

Tie:

S. 2·4	.. .. ..	−	4·04
4·6	.. .. ..	−	1·65

Bracing:

S. 3·4	.. .. ..	+	1·00
4·5	.. .. ..	−	2·45
5·6 *	.. .. ..		0·00

TRUSS DIAGRAM No. 82.

CONDITIONS.

1. Rise of truss	$\frac{1}{6}$ of the span.
2. Rise of tie rod	Nil.
3. Number of panels	6.
4. Description of truss	Braced triangle.

EVENLY DISTRIBUTED DEAD LOAD.

Stress Constants.

Rafters:

S. 2·3	.. .. ..	+	6·78
3·5	.. .. ..	+	5·64
5·7	.. .. ..	+	6·04

Tie:

S. 2·4	.. .. ..	−	6·30
4·6	.. .. ..	−	3·80

* Not necessary to stability of truss.

Bracing:

S. 3·4	+	1·20
5·4	+	1·20
7·4	−	2·52
6·7* (only supports part of tie rod).		

LIVE LOAD (WIND PRESSURE).

Maximum Stress Constants.

Rafters:

S. 2·3	+	4·07
3·5	+	3·24
5·7	+	4·07

Tie:

S. 2·4	−	4·72
4·6	−	2·02

Bracing:

S. 3·4	+	1·31	S. 4·7	−	2·70
4·5	+	1·31	6·7*		0·00

* Not necessary to stability of truss.

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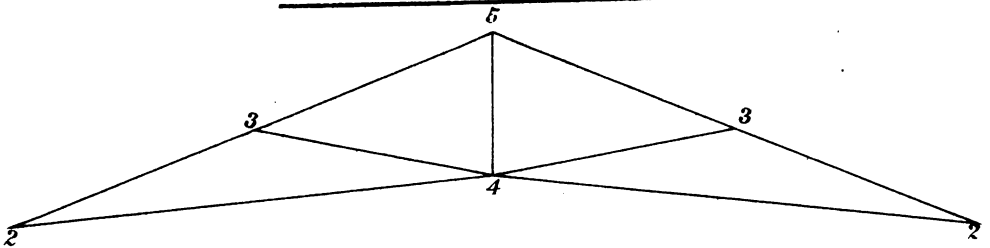

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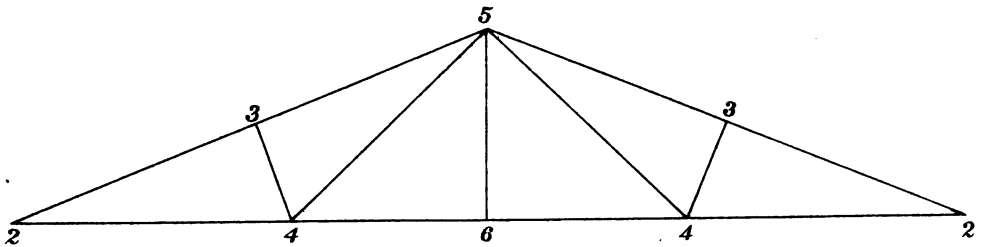

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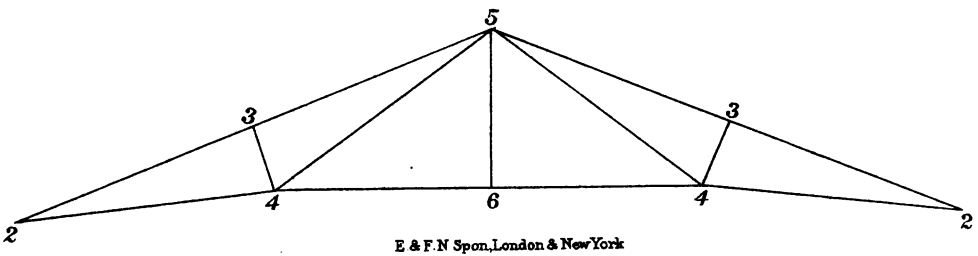

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TRUSS DIAGRAM No. 83.

CONDITIONS.

1.	Rise of truss	$\frac{1}{6}$ of the span.
2.	Rise of tie rod	$\frac{1}{30}$ of the span.
3.	Number of panels	6.
4.	Description of truss	Braced polygon.

EVENLY DISTRIBUTED DEAD LOAD.

Stress Constants.

Rafters:

S. 2·3	.. .. ..	+ 9·60
3·5	.. .. ..	+ 8·10
5·7	.. .. ..	+ 8·85

Tie:

S. 2·4	.. .. ..	− 8·95
4·6	.. .. ..	− 4·50

Bracing:

S. 3·4	.. .. ..	+ 1·48
5·4	.. .. ..	+ 1·48
7·4	.. .. ..	− 4·70

6·7 * (only supports part of tie rod).

* Not necessary to stability of truss.

LIVE LOAD (WIND PRESSURE).

Maximum Stress Constants.

Rafters:

S. 2·3	+	6·13
3·5	+	4·93
5·7	+	6·13

Tie:

S. 2·4	−	6·71
4·6	−	2·38

Bracing:

S. 3·4	+	1·55	S. 4·7	−	4·33
4·5	+	1·55	6·7 *		0·00

TRUSS DIAGRAM No. 84.

CONDITIONS.

1. Rise of truss .. .. { Long Slope 1 in 2¾. Short Slope 1 in 0·625.
2. Rise of tie rod .. .. Nil.
3. Number of panels .. .. 5.
4. Description of truss .. .. Braced triangle.

EVENLY DISTRIBUTED DEAD LOAD.

Stress Constants.

Rafters:

S. 2·3	+	5·40	S. 7·9	+	2·70
3·5	+	5·40	9·12	+	2·35
5·7	+	4·05			

* Not necessary to stability of truss.

Tie:

S. 2·4	−	5·00	S. 8·10	−	1·25
4·6	−	3·75	10·12	−	1·25
6·8	−	2·50			

Bracing:

S. 3·4	..	..	..	+	1·00
5·6	..	..	..	+	1·50
7·8	..	..	..	+	2·00
9.10*	(only supports part of tie rod).				
4·5	..	..	..	−	1·60
6·7	..	..	..	−	1·95
8·9	..	..	..	−	2·35

Live Load (Wind Pressure).

Maximum Stress Constants.

Rafters:

S. 2·3	+	4·12	S. 7·9	+	2·43
3·5	+	4·52	9·12	+	2·04
5·7	+	3·48			

Tie:

S. 2·4	−	5·12	S. 8·10	−	1·09
4·6	−	3·80	10·12	−	1·09
6·8	−	2·46			

Bracing:

S. 3·4	+	1·08	S. 4·5	−	1·72
5·6	+	1·62	6·7	−	2·10
7·8	+	2·16	8·9	−	2·56
9·10*		0·00			

* Not necessary to stability of truss.

TRUSS DIAGRAM No. 85.

CONDITIONS.

1. Rise of truss	$\frac{1}{5}$ of the span.
2. Rise of tie rod	Nil.
3. Number of panels	6.
4. Description of truss	Braced triangle.

EVENLY DISTRIBUTED DEAD LOAD.

Stress Constants.

Rafters:

S. 2·3	+	6·75
3·5	+	5·40
5·7	+	4·05

Tie:

S. 2·4	−	6·25
4·6	−	6·25
6·8	−	3·75

Bracing:

S. 3·4* (only supports part of tie rod).		
5·6	−	0·50
7·8	−	2·00
3·6	+	1·34
5·8	+	1·62

Not necessary to stability of truss.

TRUSS DIAGRAMS

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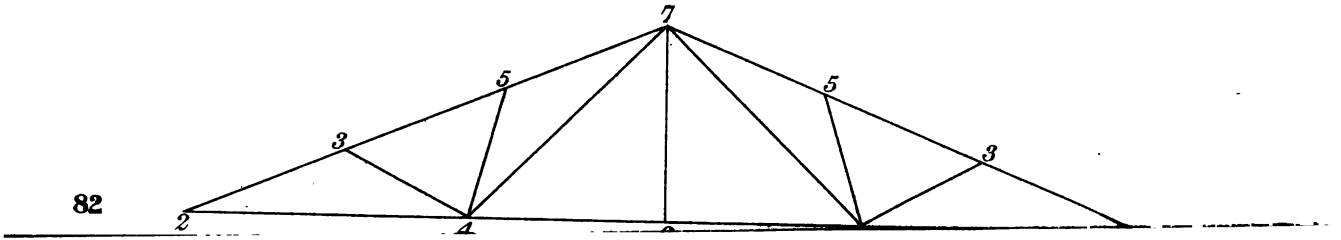

·45
·73

·33
·68

·68
·68

·15
·99

·04

1. Rise o
2. Rise o
3. Numb
4. Descri

Rafters:

S. 2·
3·
5·

Tie:

S. 2·
4·
6·

Bracing:

S. 3·
5·
7·
3·
5·

Live Load (Wind Pressure).

Maximum Stress Constants.

Rafters:

S. 2·3	..	..	..	+	4·04
3·5	..	..	..	+	2·99
5·7	..	..	..	+	2·15

Tie:

S. 2·4	..	..	..	−	4·68
4·6	..	..	..	−	4·68
6·8	..	..	..	−	3·33

Bracing:

S. 3·4*		0·00	S. 3·6	+	1·45
5·6	−	0·54	5·8	+	1·73
7·8	−	1·07			

* Not necessary to stability of truss.

TRUSS DIAGRAM No. 86.

Conditions.

1. Rise of truss	$\frac{1}{5}$ of the span.
2. Rise of tie rod	$\frac{1}{30}$ of the span.
3. Number of panels	6.
4. Description of truss	Braced trapezium.

Evenly distributed Dead Load.

Stress Constants.

Rafters:

S. 2·3	.. .. ..	+	8·08
3·5	.. .. ..	+	6·47
5·7	.. .. ..	+	4·86

Tie:

S. 2·4	.. .. ..	−	7·52
4·6	.. .. ..	−	7·52
6·8	.. .. ..	−	6·02

Bracing:

S. 3·4 * (only supports part of tie rod).			
5·6	.. .. ..	−	0·50
7·8	.. .. ..	−	2·60
3·6	.. .. ..	+	1·55
5·8	.. .. ..	+	1·77

* Not necessary to stability of truss.

Live Load (Wind Pressure).

Maximum Stress Constants.

Rafters:

S. 2·3	+	5·08
3·5	+	3·74
5·7	+	2·60

Tie:

S. 2·4	−	5·67
4·6	−	5·67
6·8	−	4·04

Bracing:

S. 3·4 *		0·00	S. 3·6	+	1·67
5·6	−	0·54	5·8	+	1·89
7·8	−	1·41			

* Not necessary to stability of truss.

TRUSS DIAGRAM No. 87.

CONDITIONS.

1. Rise of truss	$\frac{1}{5}$ of the span.
2. Rise of tie rod	Nil.
3. Number of panels	8.
4. Description of truss	Braced triangle.

EVENLY DISTRIBUTED DEAD LOAD.

Stress Constants.

Rafters:

S. 2·3	+	9·40	S. 5·7	+	6·70
3·5	+	8·05	7·9	+	5·35

Tie:

S. 2·4	−	8·75	S. 6·8	−	7·48
4·6	−	8·75	8·10	−	6·22

Bracing:

S. 3·4 * (only supports part of tie rod).

5·6	−	0·50
7·8	−	1·00
9·10	−	3·00
3·6	+	1·34
5·8	+	1·60
7·10	+	1·95

* Not necessary to stability of truss.

Live Load (Wind Pressure).

Maximum Stress Constants.

Rafters:

S. 2·3	+	5·83	S. 5·7	+	3·73
3·5	+	4·78	7·9	+	2·88

Tie:

S. 2·4	−	6·70	S. 6·8	−	5·35
4·6	−	6·70	8·10	−	4·00

Bracing:

S. 3·4*		0·00	S. 3·6	+	1·45
5·6	−	0·54	5·8	+	1·72
7·8	−	1·80	7·10	+	2·10
9·10	−	1·62			

* Not necessary to stability of truss.

TRUSS DIAGRAM No. 88.

CONDITIONS.

1. Rise of truss	$\frac{1}{5}$ of the span.
2. Rise of tie rod	$\frac{1}{8\cdot0}$ of the span.
3. Number of panels	8.
4. Description of truss	Braced trapezium.

EVENLY DISTRIBUTED DEAD LOAD.

Stress Constants.

Rafters:

S. 2·3	+	11·30	S. 5·7	+	8·06
3·5	+	9·68	7·9	+	6·44

Tie:

S. 2·4	−	10·50	S. 6·8	−	9·00
4·6	−	10·50	8·10	−	7·50

Bracing:

S. 3·4 * (only supports part of tie rod).		
5·6	−	0·50
7·8	−	1·00
9·10	−	3·80
3·6	+	1·55
5·8	+	1·75
7·10	+	2·05

* Not necessary to stability of truss.

TRUSS DIAGRAMS

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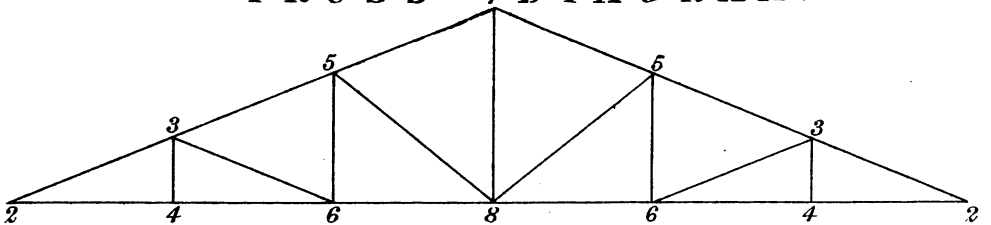

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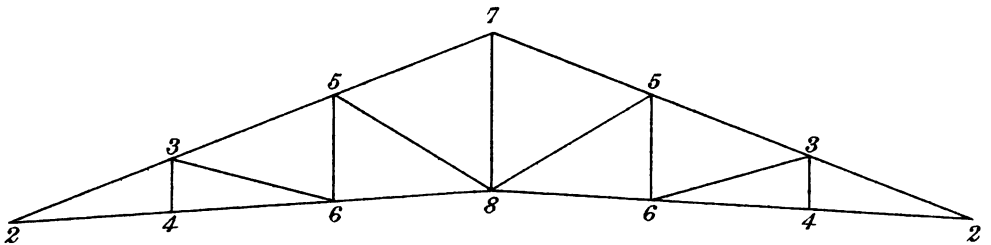

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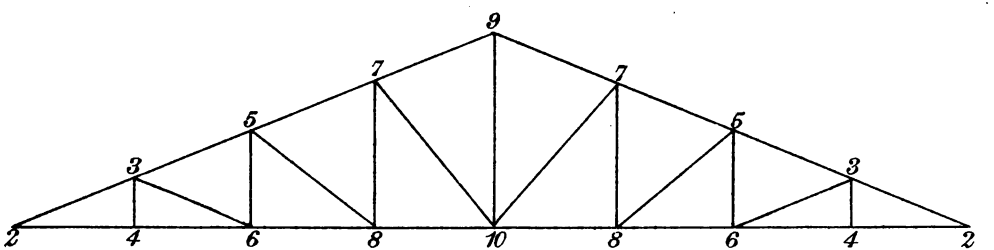

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LIVE LOAD (WIND PRESSURE).

Maximum Stress Constants.

Rafters:

S. 2·3	+	7·24	S. 5·7	+	4·56
3·5	+	5·90	7·9	+	3·44

Tie:

S. 2·4	−	8·06	S. 6·8	−	6·44
4·6	−	8·06	8·10	−	4·82

Bracing:

S. 3·4*		0·00	S. 3·6	+	1·68
5·6	−	0·54	5·8	+	1·88
7·8	−	1·08	7·10	+	2·22
9·10	−	2·02			

* Not necessary to stability of truss.

TRUSS DIAGRAM No. 89.

CONDITIONS.

1.	Rise of truss	$\frac{1}{5}$ of the span.
2.	Rise of tie rod	Nil.
3.	Number of panels	8.
4.	Description of truss	Braced triangle.

EVENLY DISTRIBUTED DEAD LOAD.

Stress Constants.

Rafters:

S. 2·3	+	9·40	S. 5·7	+	8·66
3·5	+	9·03	7·9	+	8·29

Tie:

S. 2.4	.. .. ..	−	8·73
4·6	.. .. ..	−	7·48
6·10	.. .. ..	−	5·00

Bracing:

S. 3·4	.. .. ..	+	0·93
5·6	.. .. ..	+	1·86
7·8	.. .. ..	+	0·93
4·5	.. .. ..	−	1·24
5·8	.. .. ..	−	1·24
6·8	.. .. ..	−	2·48
8·9	.. .. ..	−	3·72
9·10* (only supports part of tie rod).			

* Not necessary to stability of truss.

Live Load (Wind Pressure).

Maximum Stress Constants.

Rafters:

S. 2·3	+	5·90	S. 5·7	+	5·90
3·5	+	5·90	7·9	+	5·90

Tie:

S. 2·4	..	..	..	−	6·80
4·6	..	..	..	−	5·45
6·10	..	..	..	−	2·70

Bracing:

S. 3·4	+	1·00	S. 5·8	−	1·35
5·6	+	2·00	6·8	−	2·70
7·8	+	1·00	8·9	−	4·05
4·5	−	1·35	9·10 *		0·00

* Not necessary to stability of truss.

TRUSS DIAGRAM No. 90.

CONDITIONS.

1. Rise of truss	$\frac{1}{8}$ of the span.
2. Rise of tie rod	$\frac{1}{10}$ of the span.
3. Number of panels	8.
4. Description of truss	Braced polygon.

EVENLY DISTRIBUTED DEAD LOAD.

Stress Constants.

Rafters:

S. 2·3	+ 12·24	S. 5·7	+ 11·50
3·5	+ 11·87	7·9	+ 11·13

Tie:

S. 2·4	− 11·42
4·6	− 9·80
6·10	− 5·74

Bracing:

S. 3·4	+ 0·93
5·6	+ 1·86
7·8	+ 0·93
4·5	− 1·60
5·8	− 1·60
6·8	− 4·26
8·9	− 5·86

9·10 * (only supports part of tie rod).

* Not necessary to stability of truss.

Live Load (Wind Pressure).

Maximum Stress Constants.

Rafters:

S. 2·3	+	7·88	S. 5·7	+	7·88
3·5	+	7·88	7·9	+	7·88

Tie:

S. 2·4	..	..	..	−	8·66
4·6	..	..	..	−	6·92
6·10	..	..	..	−	3·04

Bracing:

S. 3·4	+	1·00	S. 5·8	−	1·75
5·6	+	2·00	6·8	−	3·98
7·8	+	1·00	8·9	−	5·72
4·5	−	1·75	9·10*		0·00

* Not necessary to stability of truss.

TRUSS DIAGRAM No. 91.

CONDITIONS.

1. Rise of truss	$\frac{1}{5}$ of the span.
2. Rise of tie rod	Nil.
3. Number of panels	12.
4. Description of truss	Braced triangle.

EVENLY DISTRIBUTED DEAD LOAD.

Stress Constants.

Rafters:

S. 2·3	+ 14·85	S. 7·9	+ 10·80
3·5	+ 13·50	9·11	+ 9·45
5·7	+ 12·15	11·13	+ 8·10

Tie:

S. 2·4	− 13·80	S. 8·10	− 11·30
4·6	− 13·80	10·12	− 10·05
6·8	− 12·55	12·14	− 8·80

Bracing:

S. 3·4* (only supports part of tie rod).	
5·6	− 0·50
7·8	− 1·00
9·10	− 1·50
11·12	− 2·00
13·14	− 5·00

* Not necessary to stability of truss.

TRUSS DIAGRAMS

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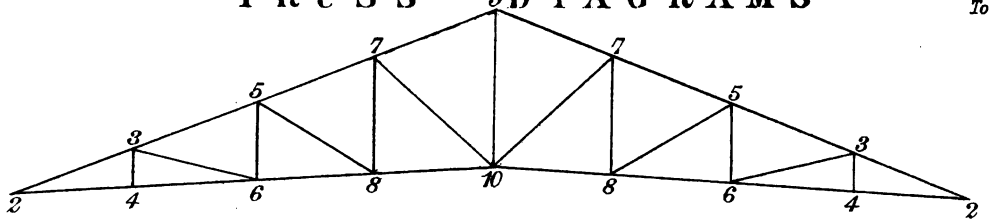

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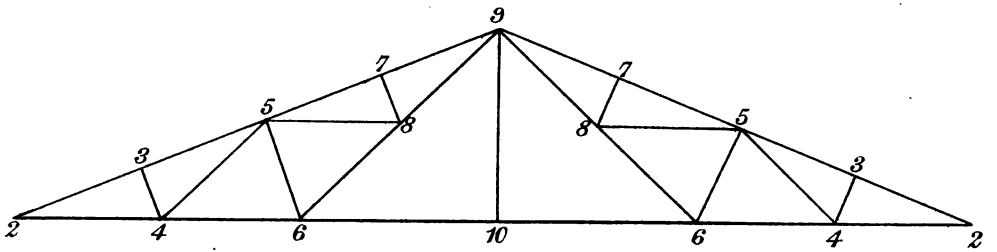

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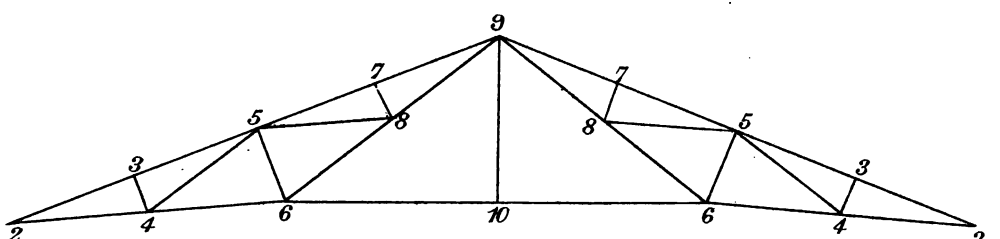

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Bracing—*continued.*

S. 3·6	.. .. ..	+ 1·35
5·8	.. .. ..	+ 1·52
7·10	.. .. ..	+ 1·90
9·12	.. .. ..	+ 2·34
11·14	.. .. ..	+ 2·80

Live Load (Wind Pressure).

Maximum Stress Constants.

Rafters:

S. 2·3	+	9·52	S. 7·9	+	6·34
3·5	+	8·46	9·11	+	5·28
5·7	+	7·40	11·13	+	4·40

Tie:

S. 2·4	−	10·86	S. 8·10	−	8·14
4·6	−	10·86	10·12	−	6·78
6·8	−	9·50	12·14	−	5·42

Bracing:

S. 3·4*		0·00	S. 3·6	+	1·46
5·6	−	0·54	5·8	+	1·74
7·8	−	1·08	7·10	+	2·10
9·10	−	1·62	9·12	+	2·56
11·12	−	2·16	11·14	+	3·00
13·14	−	2·70			

* Not necessary to stability of truss.

TRUSS DIAGRAM No. 92.

CONDITIONS.

1. Rise of truss	$\frac{1}{8}$ of the span.
2. Rise of tie rod	$\frac{1}{40}$ of the span.
3. Number of panels	12.
4. Description of truss	Braced trapezium.

EVENLY DISTRIBUTED DEAD LOAD.

Stress Constants.

Rafters:

S. 2·3	+	16·90	S. 7·9	+	12·28
3·5	+	15·36	9·11	+	10·74
5·7	+	13·82	11·13	+	9·20

Tie:

S. 2·4	−	15·74	S. 8·10	−	12·84
4·6	−	15·74	10·12	−	11·39
6·8	−	14·29	12·14	−	9·94

Bracing:

S. 3·4* (only supports part of tie rod)		
5·6	−	0·50
7·8	−	1·00
9·10	−	1·50
11·12	−	2·00
13·14	−	5·80

* Not necessary to stability of truss.

Bracing—*continued.*

S. 3·6	..	..	..	+	1·50
5·8	..	..	..	+	1·70
7·10	..	..	..	+	2·04
9·12	..	..	..	+	2·38
11·14	..	..	..	+	2·82

Live Load (Wind Pressure).

Maximum Stress Constants.

Rafters:

S. 2·3	+	11·10	S. 7·9	+	7·29
3·5	+	9·83	9·11	+	6·02
5·7	+	8·56	11·13	+	4·97

Tie:

S. 2·4	−	12·36	S. 8·10	−	9·26
4·6	−	12·36	10·12	−	7·71
6·8	−	10·81	12·14	−	6·16

Bracing:

S. 3·4*		0·00	S. 3·6	+	1·60
5·6	−	0·54	5·8	+	1·86
7·8	−	1·08	7·10	+	2·17
9·10	−	1·62	9·12	+	2·60
11·12	−	2·16	11·14	+	3·04
13·14	−	3·15			

* Not necessary to stability of truss.

TRUSS DIAGRAM No. 93.

CONDITIONS.

1. Rise of truss	$\frac{1}{8}$ of the span.
2. Rise of tie rod	Nil.
3. Number of panels	8.
4. Description of truss	Braced triangle.

EVENLY DISTRIBUTED DEAD LOAD.

Stress Constants.

Rafters:

S. 2·3	+ 11·05	S. 5·7	+ 10·43
3·5	+ 10·74	7·9	+ 10·12

Tie:

S. 2·4	.. .. ..	−	10·50
4·6	.. .. ..	−	9·00
6·10	.. .. ..	−	6·00

Bracing:

S. 3·4	.. .. ..	+	0·95
5·6	.. .. ..	+	1·90
7·8	.. .. ..	+	0·95
4·5	.. .. ..	−	1·50
5·8	.. .. ..	−	1·50
6·8	.. .. ..	−	3·00
8·9	.. .. ..	−	4·50

9·10 * (only supports part of tie rod).

* Not necessary to stability of truss.

Live Load (Wind Pressure).

Maximum Stress Constants.

Rafters:

S. 2·3	+	7·18	S. 5·7	+	7·18
3·5	+	7·18	7·9	+	7·18

Tie:

S. 2·4	..	..	..	−	7·92
4·6	..	..	..	−	6·34
6·10	..	..	..	−	3·17

Bracing:

S. 3·4	+	1·00	S. 5·8	−	1·56
5·6	+	2·00	6·8	−	3·16
7·8	+	1·00	8·9	−	4·74
4·5	−	1·56	9·10*		0·00

* Not necessary to stability of truss.

TRUSS DIAGRAM No. 94.

CONDITIONS.

1. Rise of truss	$\frac{1}{6}$ of the span.
2. Rise of tie rod	$\frac{1}{40}$ of the span.
3. Number of panels	8.
4. Description of truss	Braced polygon.

EVENLY DISTRIBUTED DEAD LOAD.

Stress Constants.

Rafters:

S. 2·3	+ 15·33	S. 5·7	+ 14·71
3·5	+ 15·02	7·9	+ 14·40

Tie:

S. 2·4	.. .. ..	− 14·60
4·6	.. .. ..	− 12·55
6·10	.. .. ..	− 7·15

Bracing:

S. 3·4	.. .. ..	+ 0·95
5·6	.. .. ..	+ 1·90
7·8	.. .. ..	+ 0·95
4·5	.. .. ..	− 2·05
5·8	.. .. ..	− 2·05
6·8	.. .. ..	− 5·60
8·9	.. .. ..	− 7·65
9·10 *	(only supports part of tie rod).	

* Not necessary to stability of truss.

TRUSS DIAGRAMS

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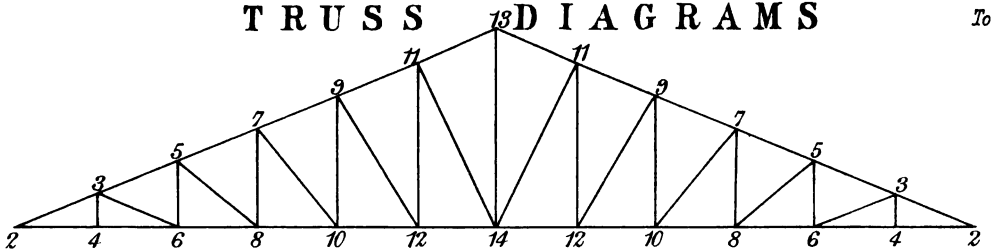

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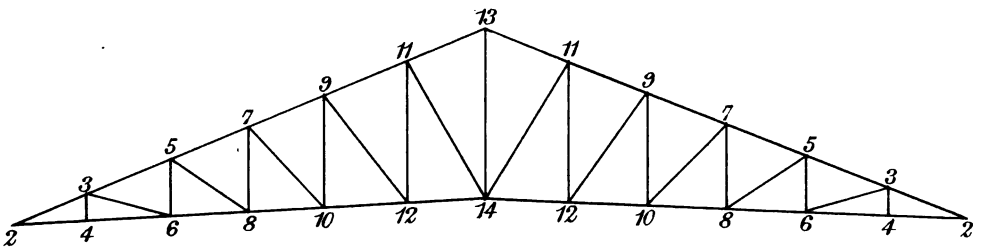

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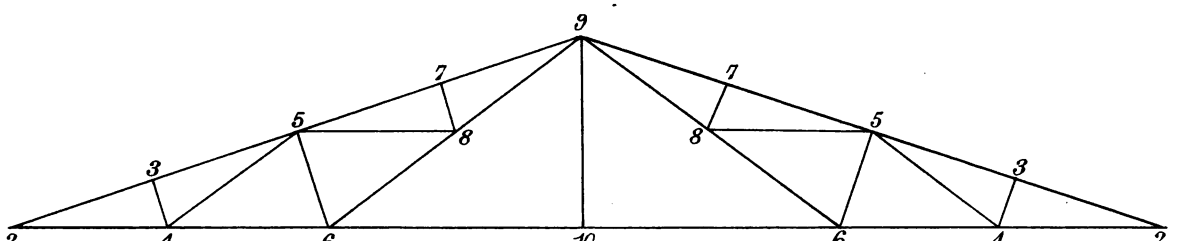

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Live Load (Wind Pressure).

Maximum Stress Constants.

Rafters:

S. 2·3	+	10·54	S. 5·7	+	10·54
3·5	+	10·54	7·9	+	10·54

Tie:

S. 2·4	..	..	..	−	11·15
4·6	..	..	..	−	8·93
6·10	..	..	..	−	3·75

Bracing:

S. 3·4	+	1·00	S. 5·8	−	2·22
5·6	+	2·00	6·8	−	5·30
7·8	+	1·00	8·9	−	7·52
4·5	−	2·22	9·10*		0·00

* Not necessary to stability of truss.

TRUSS DIAGRAM No. 95.

CONDITIONS.

1. Rise of truss	⅛ of the span.
2. Rise of tie rod	Nil.
3. Number of panels	12.
4. Description of truss	Braced triangle.

EVENLY DISTRIBUTED DEAD LOAD.

Stress Constants.

Rafters:

S. 2·3	+ 17·49	S. 7·9	+ 12·72
3·5	+ 15·90	9·11	+ 11·13
5·7	+ 14·31	11·13	+ 9·54

Tie:

S. 2·4	− 16·50	S. 8·10	− 13·50
4·6	− 16·50	10·12	− 12·00
6·8	− 15·00	12·14	− 10·50

Bracing:

S. 3·4*	(only supports part of tie rod).	
5·6	.. .. ..	− 0·50
7·8	.. .. ..	− 1·00
9·10	.. .. ..	− 1·50
11·12	.. .. ..	− 2·00
13·14	.. .. ..	− 5·00
3·6	.. .. ..	+ 1·59
5·8	.. .. ..	+ 1·80

* Not necessary to stability of truss.

Bracing—*continued.*

S. 7·10	..	..	..	+	2·12
9·12	..	..	..	+	2·52
11·14	..	..	..	+	2·92

Live Load (Wind Pressure).

Maximum Stress Constants.

Rafters.

S. 2·3	+	11·52	S. 7·9	+	7·50
3·5	+	10·18	9·11	+	6·16
5·7	+	8·84	11·13	+	4·98

Tie:

S. 2·4	−	12·66	S. 8·10	−	9·48
4·6	−	12·66	10·12	−	7·89
6·8	−	11·07	12·14	−	6·30

Bracing:

S. 3·4*		0·00	S. 3·6	+	1·67
5·6	−	0·52	5·8	+	1·90
7·8	−	1·05	7·10	+	2·24
9·10	−	1·58	9·12	+	2·64
11·12	−	2·10	11·14	+	3·08
13·14	−	2·63			

* Not necessary to stability of truss.

TRUSS DIAGRAM No. 96.

CONDITIONS.

1. Rise of truss .. .. $\frac{1}{6}$ of the span.
2. Rise of tie rod .. .. $\frac{1}{10}$ of the span.
3. Number of panels .. .. 12.
4. Description of truss .. .. Braced trapezium.

EVENLY DISTRIBUTED DEAD LOAD.

Stress Constants.

Rafters:

S. 2·3	+ 20·55	S. 7·9	+ 14·94
3·5	+ 18·68	9·11	+ 13·07
5·7	+ 16·81	11·13	+ 11·20

Tie:

S. 2·4	− 19·52	S. 8·10	− 15·96
4·6	− 19·52	10·12	− 14·18
6·8	− 17·74	12·14	− 12·40

Bracing:

S. 3·4 *	(only supports part of tie rod).	
5·6	.. .. ..	− 0·50
7·8	.. .. ..	− 1·00
9·10	.. .. ..	− 1·50
11·12	.. .. ..	− 2·00
13·14	.. .. ..	− 6·08
3·6	.. .. ..	+ 1·84
5·8	.. .. ..	+ 2·00

* Not necessary to stability of truss.

Bracing—*continued.*

S. 7·10	.. .. ..	+ 2·24
9·12	.. .. ..	+ 2·60
11·14	.. .. ..	+ 2·98

Live Load (Wind Pressure).

Maximum Stress Constants.

Rafters:

S. 2·3	+	13·70	S. 7·9	+	8·86
3·5	+	12·09	9·11	+	7·24
5·7	+	10·47	11·13	+	5·84

Tie:

S. 2·4	−	14·78	S. 8·10	−	11·08
4·6	−	14·78	10·12	−	9·23
6·8	−	12·93	12·14	−	7·38

Bracing:

S. 3·4*		0·00	S. 3·6	+	1·88
5·6	−	0·52	5·8	+	2·12
7·8	−	1·05	7·10	+	2·37
9·10	−	1·58	9·12	+	2·76
11·12	−	2·10	11·14	+	3·14
13·14	−	3·20			

* Not necessary to stability of truss.

TRUSS DIAGRAM No. 97.

CONDITIONS.

1. Rise of truss .. .. { $\frac{1}{6}$ of the span. / Depth at ends $\frac{1}{10}$ of the span.
2. Rise of tie .. .. $\frac{1}{3}$ of the span.
3. Number of panels .. .. 10.
4. Description of truss .. .. { Top members inclined 1 in $2\frac{1}{2}$. / Bottom ditto parabolic.

EVENLY DISTRIBUTED DEAD LOAD.

Stress Constants.

Rafters:

S.	1·3	+ 10·72	S.	7·9	+ 14·37
	3·5	+ 17·20		9·11	+ 10·78
	5·7	+ 17·30			

Tie:

S.	2·4 *	0·00	S.	8·10	− 16·15
	4·6	− 10·59		10·12	− 13·41
	6·8	− 16·66			

Bracing:

S.	1·2 *	0·00	S.	1·4	− 10·00
	3·4	+ 4·00		3·6	− 6·07
	5·6	+ 1·10		5·8	− 0·16
	7·8	− 1·54		7·10	+ 3·16
	9·10	− 3·33		9·12	+ 4·33
	11·12	− 7·00			

Note.—This truss should be supported at the points 1 − 1.

* Not necessary to stability of truss.

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1. Rise (
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3. Numl
4. Descr

Rafters:

S. 1·
3·
5·

Tie:

S. 2·
4·
6·

Bracing:

S. 1·
3·
5·
7·
9·
11·

Note.—T

1 — 1.

Live Load (Wind Pressure).

Maximum Stress Constants.

Rafters:

S.	1·3	+ 6·66	S.	7·9	+ 8·43
	3·5	+ 11·42		9·11	+ 5·80
	5·7	+ 11·06			

Tie:

S.	1·4	− 7·88	S.	8·10	− 11·33
	4·6	− 8·33		10·12	− 8·40
	6·8	− 12·28			

Bracing:

S.	3·4	+ 3·10	S.	11·12	− 3·77
	3·4	− 0·00		3·6	+ 0·00
	5·6	+ 0·54		3·6	− 4·06
	5·6	− 0·00		5·8	+ 0·74
	7·8	+ 0·00		5·8	− 0·88
	7·8	− 1·44		7·10	+ 3·13
	9·10	+ 0·00		7·10	− 0·00
	9·10	− 2·70		9·12	+ 3·97
	11·12	+ 0·00		9·12	− 0·00

Note.—This truss should be supported at the points 1 − 1.

TRUSS DIAGRAM No. 98.

CONDITIONS.

1. Rise of truss	$\frac{1}{6}$ of the span.
2. Rise of tie	$\frac{1}{8}$ of the span.
3. Number of panels	8.
4. Description of truss	Braced crescent (circular).

EVENLY DISTRIBUTED DEAD LOAD.

Stress Constants.

Rafters:

S. 2·3	+	13·70	S. 5·7	+	12·60
3·5	+	12·70	7·9	+	12·60

Tie:

S. 2·4	−	11·80	S. 6·8	−	12·60
4·6	−	12·30	8·10	−	12·70

Bracing:

S. 3·4	−	1·75	S. 5·4	−	1·70
5·6	+	0·60	7·6	+	0·20
7·8	−	1·65	9·8	−	1·40
9·10	+	0·45			

LIVE LOAD (WIND PRESSURE).

Maximum Stress Constants.

Rafters:

S. 2·3	+	9·34	S. 5·7	+	8·28
3·5	+	8·48	7·9	+	7·42

Tie:

S. 2·4	–	7·98	S. 6·8	–	7·48
4·6	–	8·18	8·10	–	6·37

Bracing:

S. 3·4	+	0·00	S. 9·10	–	0·72
3·4	–	1·08	4·5	+	0·98
5·6	+	0·00	4·5	–	0·00
5·6	–	0·98	6·7	+	0·98
7·8	+	0·00	6·7	–	0·72
7·8	–	1·42	8·9	+	1·70
9·10	+	0·00	8·9	–	1·22

TRUSS DIAGRAM No. 99.

CONDITIONS.

1. Rise of truss	$\frac{1}{6}$ of the span.
2. Rise of tie	$\frac{1}{8}$ of the span.
3. Number of panels	8.
4. Description of truss	Braced crescent (circular).

EVENLY DISTRIBUTED DEAD LOAD.

Stress Constants.

Rafters:

S. 2·3	+	12·30	S. 5·7	+	13·10
3·5	+	13·50	7·9	+	12·90

Tie:

S. 2·4	−	10·40	S. 6·8	−	12·20
4·6	−	11·70	8·8	−	12·20

Bracing:

S. 3·4	−	2·40	S. 6·7	−	0·91
4·5	−	1·05	7·8	−	1·04
5·6	−	1·36	8·9	−	1·00

Live Load (Wind Pressure).

Maximum Stress Constants.

Rafters:

S. 2·3	+	8·62	S. 5·7	+	8·42
3·5	+	9·22	7·9	+	7·22

Tie:

S. 2·4	−	7·30	S. 6·8	−	7·36
4·6	−	8·08	8·8	−	6·21

Bracing:

S. 3·4	+	0·00	S. 6·7	+	0·20
3·4	−	1·52	6·7	−	1·28
4·5	+	0·00	7·8	+	0·16
4·5	−	0·70	7·8	−	1·45
5·6	+	0·00	8·9	+	0·60
5·6	−	1·10	8·9	−	1·34

TRUSS DIAGRAM No. 100.

CONDITIONS.

1. Rise of truss	$\frac{4}{15}$ of the span.
2. Rise of tie	$\frac{1}{15}$ of the span.
3. Number of panels	13.
4. Description of truss	Braced crescent (parabolic).

EVENLY DISTRIBUTED DEAD LOAD.

Stress Constants.

Rafters:

S. 2·3	+ 17·29	S. 15·17	+ 14·18
3·5	+ 16·37	17·19	+ 14·47
5·7	+ 15·58	19·21	+ 14·94
7·9	+ 14·94	21·23	+ 15·58
9·11	+ 14·47	23·25	+ 16·37
11·13	+ 14·18	25·28	+ 17·29
13·15	+ 14·08		

Tie:

S. 2·4	− 14·63	S. 16·18	− 14·10
4·6	− 14·47	18·20	− 14·15
6·8	− 14·35	20·22	− 14·22
8·10	− 14·22	22·24	− 14·35
10·12	− 14·15	24·26	− 14·47
12·14	− 14·10	26·28	− 14·63
14·16	− 14·08		

Bracing:

S. 3·4	–	0·66	S. 3·6		0·00
5·6	–	0·66	5·8		0·00
7·8	–	0·66	7·10		0·00
9·10	–	0·66	9·12		0·00
11·12	–	0·66	11·14		0·00
13·14	–	0·66	13·16		0·00
15·16	–	0·66	15·18		0·00
17·18	–	0·66	17·20		0·00
19·20	–	0·66	19·22		0·00
21·22	–	0·66	21·24		0·00
23·24	–	0·66	23·26		0·00
25·26	–	0·66			

Live Load (Wind Pressure).

Maximum Stress Constants.

Rafters:

S. 2·3	+	12·90	S. 15·17	+	8·50
3·5	+	11·60	17·19	+	9·38
5·7	+	10·56	19·21	+	10·26
7·9	+	9·50	21·23	+	11·10
9·11	+	8·63	23·25	+	12·20
11·13	+	7·59	25·28	+	12·90
13·15	+	7·57			

Tie:

S. 2·4	–	11·00	S. 16·18	–	7·59
4·6	–	10·86	18·20	–	8·47
6·8	–	10·15	20·22	–	9·24
8·10	–	9·62	22·24	–	9·86
10·12	–	9·04	24·26	–	10·34
12·14	–	8·40	26·28	–	11·00
14·16	–	7·57			

Bracing:

S. 3·4	−	0·58	S. 25·26	+	0·00
3·4	+	0·00	3·6	+	0·62
5·6	−	0·70	3·6	−	0·23
5·6	+	0·00	5·8	+	0·52
7·8	−	0·92	5·8	−	0·48
7·8	+	0·08	7·10	+	0·77
9·10	−	0·78	7·10	−	0·68
9·10	+	0·40	9·12	+	0·92
11·12	−	1·28	9·12	−	1·04
11·12	+	0·45	11·14	+	1·53
13·14	−	1·57	11·14	−	1·25
13·14	+	0·82	13·16	+	1·94
15·16	−	1·85	13·16	−	1·94
15·16	+	1·37	15·18	+	1·37
17·18	−	1·38	15·18	−	1·67
17·18	+	0·98	17·20	+	1·03
19·20	−	1·10	17·20	−	1·28
19·20	+	0·48	19·22	+	0·85
21·22	−	0·85	19·22	−	0·94
21·22	+	0·20	21·24	+	0·67
23·24	−	0·64	21·24	−	0·60
23·24	+	0·00	23·26	+	0·40
25·26	−	0·46	23·26	−	0·68

END OF PART II.

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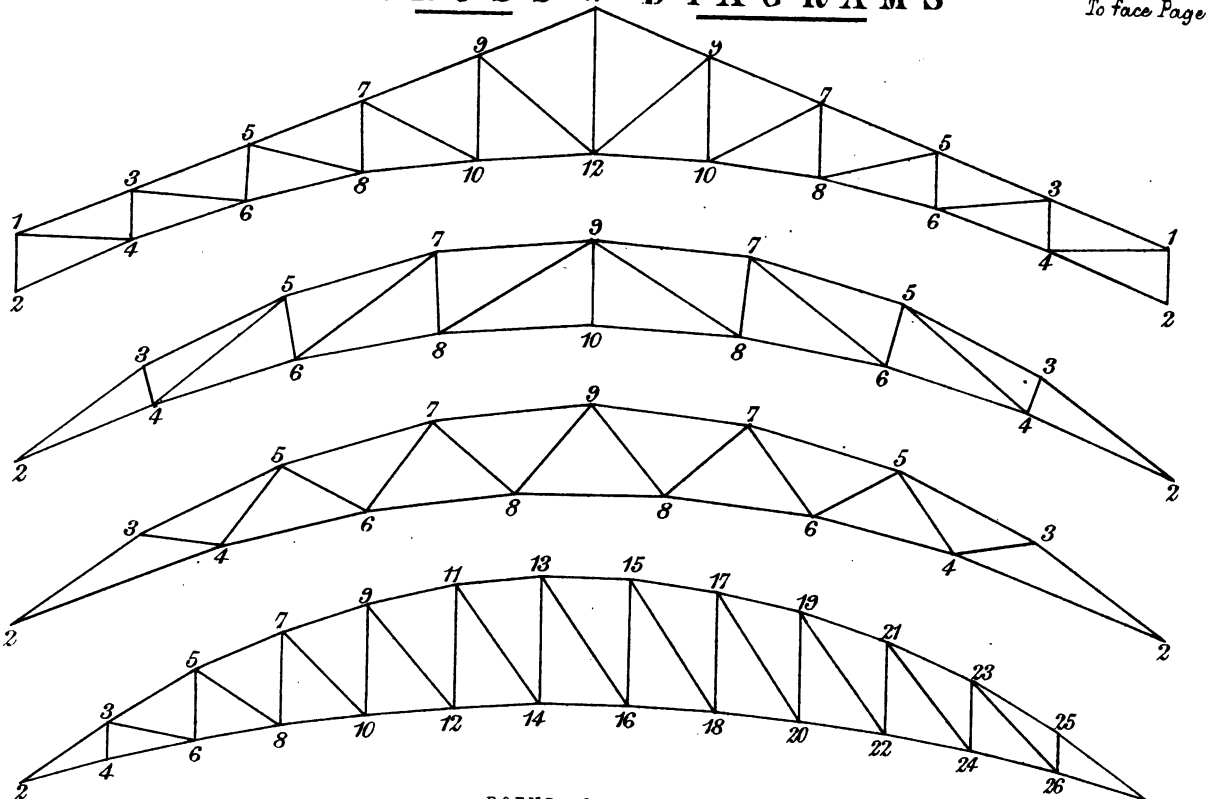
TRUSS DIAGRAMS

To face Page 216.



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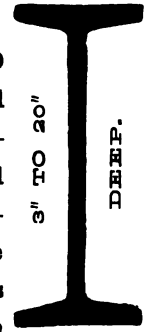

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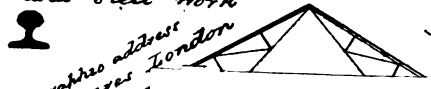

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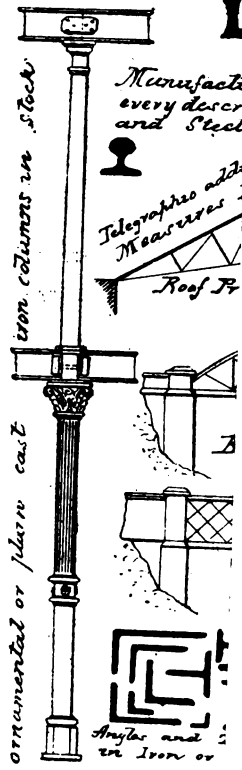

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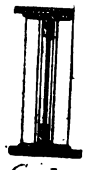

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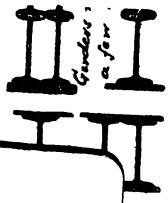

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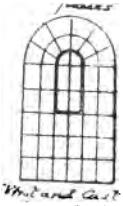

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